

AFIT/GAL/LAL/97S-3

**INTERNATIONAL ARMAMENTS COOPERATION
IN THE POST-COLD WAR ERA**

THESIS

**Paul L. Hartman, First Lieutenant, USAF
AFIT/GAL/LAL/97S-3**

19971008 033

Approved for public release; distribution unlimited

| DTIC QUALITY INSPECTED 3

The opinions and ideas contained in the thesis are those of the author and do not reflect the official policy or position of the Department of Defense, the United States Air Force, or the U.S. Government.

AFIT/GAL/LAL/97S-3

**INTERNATIONAL ARMAMENTS COOPERATION IN THE
POST-COLD WAR ERA**

THESIS

**Presented to the Faculty of the Graduate School of Logistics and
Acquisition Management
of the Air Force Institute of Technology
Air University
Air Education and Training Command
In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Acquisition Logistics Management**

Paul L. Hartman, B.S.

First Lieutenant, USAF

September 1997

Approved for public release; distribution unlimited

Acknowledgments

I would first like to thank my best friend and wife, Kathy, for her unending support and encouragement during the entire graduate program. We were married in April 1996 and began classes in May. Throughout the fifteen month program she has patiently been willing to postpone our honeymoon and her own graduate studies to assist me in completing my degree. For this I am grateful; to have such a wonderful wife is truly a blessing.

I would also like to acknowledge the assistance of my thesis advisors, Dr. Craig M. Brandt and Lieutenant Colonel Karen Currie. I truly respect their vast experience in the education profession and appreciate their support. Together they provided guidance and encouragement along the road to completing this thesis.

Lastly, I want to recognize the senior Department of Defense personnel and their military assistants who took time out of their busy schedules to assist in my research process (their names appear on page 83 of the thesis). As a group they contributed valuable insight into the past, present and expected future of international armaments cooperation between the United States and its allies. In addition to answering my many questions concerning the thesis, several of them took the time to inquire about my future career plans and freely provided professional career advice. I will always consider having had the opportunity to associate on a professional and personal level with men of such great standing a lifetime gift.

Paul L. Hartman

Table of Contents

	Page
Acknowledgments.....	ii
List of Figures.....	vi
List of Tables.....	vii
Abstract.....	viii
I. Introduction.....	1
Chapter Overview.....	1
Background.....	2
Problem Statement.....	3
Research Objective.....	3
Research Questions.....	4
Definitions and Objectives of International Armaments Cooperation.....	5
Chapter Summary.....	8
II. Methodology.....	9
Chapter Overview.....	9
Research Approach.....	10
Justification.....	14
Data Collection Process.....	17
Chapter Summary.....	20
III. Literature Review.....	21
Chapter Overview.....	21
Historical Background of U.S. International Armaments Cooperation.....	22
Post-World War II.....	22
The Birth of NATO and Early Cooperative Efforts.....	24
The 1950s.....	27
The 1960s.....	31
The 1970s.....	34
The 1980s.....	40

	Page
The 1990s and the End of the Cold War.....	47
Chapter Summary.....	56
 IV. Research Findings.....	 58
Chapter Overview.....	58
Interview Results.....	58
Interview Question No. 1.....	59
Interview Question No. 2.....	63
Interview Question No. 3.....	66
Models of International Cooperation.....	68
Defense Science Board (DSB Model).....	68
The Medium Extended Air Defense System (MEADS).....	71
The Joint Strike Fighter JSF.....	73
Summary of Models.....	77
 V. Conclusions and Recommendations.....	 79
Conclusions.....	79
The Road to Arms Cooperation.....	79
The Cooperative Road Ahead.....	81
Recommendations for Further Research.....	82
Policy.....	82
Supportability Issues.....	83
Baseline Models.....	83
Appendix A: Alphabetical Listing of Personal Interviews.....	84
Appendix B: Office of the Secretary of Defense Organizational Chart.....	86
Appendix C: Office of the Under Secretary of Defense, Acquisition and Technology Organizational Chart.....	87
Appendix D: Key International Armaments Cooperation Positions.....	88
Appendix E: Federal Budget Categories as Percentages of GDP.....	89
Appendix F: Defense Industry Acquisitions and Mergers in the 1990s.....	90

	Page
Appendix G: Memorandum from U.S. Secretary of Defense William S. Cohen.....	91
Appendix H: Interview Protocol.....	93
Appendix I: U.S. DoD Systems Acquisition Model.....	96
Glossary of Acronyms.....	97
Glossary of Relevant Terms.....	99
Bibliography.....	109
Vita.....	116

List of Figures

Figure	Page
1. “Two-Way” Street—1976 to 1986.....	36
2. Federal Defense Budget 1962 - 1998.....	46
3. Appendix B: Office of the Secretary of Defense Organizational Chart.....	86
4. Appendix C: USD(A&T) Organizational Chart.....	87
5. Appendix D: Key International Armaments Cooperation Positions.....	88
6. Appendix E: Federal Budget Categories as a Percent of GDP.....	89
7. Appendix I: U.S. DoD Systems Acquisition Model.....	96

List of Tables

Table	Page
1. Armaments Cooperation of Major Weapon Systems—1950-1970.....	29

Abstract

During the height of the Cold War, the United States Department of Defense had a focused acquisition effort to produce major weapons systems. These weapons systems were developed as single service acquisition efforts. Their high costs were justified by their sophisticated technology, which enabled the U.S. military to gain and maintain air and ground combat superiority. Such acquisition practices significantly increased the defense budget, which peaked in 1985 at \$414 billion. However, with the collapse of the Soviet Union and an absence of a single galvanizing threat to global security, the U.S. has been forced to drastically cut defense spending. Although there is no longer a central security concern for the U.S., there are new threats that require new defense objectives-- and containing these threats is not cheap. Senior defense leaders agree that the U.S. policy of fielding technologically superior weapon systems will not change. What alternative, then, will effectively enable the U.S. to meet reduced spending goals, yet maintain current national security levels? This thesis suggests that international armaments cooperation is one such alternative.

To investigate the likelihood of international armaments cooperation playing a significant role in future weapons systems acquisitions, four research questions were developed: 1) "How did International Armaments Cooperation evolve from the post-World War II era up to the present?" 2) "What are the current policies, practices, and

major programs involved in International Cooperative Development?" 3) "To what degree will International Armaments Cooperation Programs be involved in the development and production of weapon systems in the future?" and 4) "Has a baseline model been developed to guide the acquisition process of major weapon systems that are International Cooperative Programs?" The research was conducted using two methods, a literature review and personal interviews. These methods were selected to provide historical and current information on international armaments cooperation, as well as forecast the utility of cooperative programs in future weapons systems acquisitions. The literature review traced the evolution of international cooperative development from post-World War II up to the present, where the personal interviews inquired about the status of current cooperative programs and the role of arms cooperation in the future. Both research methods revealed that international armaments cooperation, if implemented according to new models, is a viable alternative to former high-cost acquisition practices.

INTERNATIONAL ARMAMENTS COOPERATION IN THE POST-COLD WAR ERA

I. Introduction

Chapter Overview

This chapter describes the Background, Problem Statement, Research Objective, and Research Questions. Background issues include a shift in the U.S. Department of Defense's focus from single or joint service acquisition of major weapon systems to a search for less costly alternatives now that the Cold War has ended. The Problem Statement introduces the dilemma of shrinking the defense budget without compromising the quality or degree of national security that the U.S. has come to expect. It also suggests a need to find alternatives for developing and producing those defense systems which have guarded our nation so well, yet cost so much to provide. The Research Objective briefly describes the purpose behind collecting and reviewing data, where the Research Questions guide the overall collection and review of information. Together, these sections describe what this thesis intends to say, as well as reveal why there is a need to say it.

Background

During the height of the Cold War, the United States Department of Defense (DoD) had a focused acquisition effort to produce major weapon systems that would allow the US military to gain and maintain ground and air combat superiority. Some of these multi-million dollar weapon systems include the F-14, F-15, F-16, F-18, and F-117. Each was developed as a single service acquisition effort, which significantly increased the overall expenditure of U.S. defense funds through the early 1990s. Sources reveal that U.S. military expenses from the early 1980s through 1990 swelled from \$206 billion to roughly \$314 billion--nearly six percent of the gross national product (28:10).

With the collapse of the Soviet Union came the end of the East-West arms race, and consequently, an end to the perceived need for a large U.S. weapons inventory. In 1997, the U.S. defense budget dropped to \$273 billion and continues to decrease, with procurement spending down 71% (12:5). However, although the Cold War has ended, the need to protect U.S. national interests at home and abroad remains strong (9:177). For this reason there is a continued need for research and development (R&D) of advanced technology defense systems. But, alas, cost-effective funding of R&D requires large economies of scale, as the R&D phase of producing weapon systems can be expensive and precarious.

What alternative, then, will effectively enable the U.S. to meet reduced defense spending goals, yet maintain current national security levels? International cooperative development programs could be a solution to such a dilemma. By taking advantage of opportunities for arms cooperation, the DoD could see political, economic and

technological benefits. These benefits include improved international political relationships, shared research and development costs, and access to foreign technologies.

Problem Statement

In an era of reduced defense spending and limited resources, the U.S. must be able to “partner more efficiently with friendly nations” (48). Under such circumstances, the DoD must look for alternatives to the current expensive research and development (R&D), and acquisition efforts without conceding its current superior defense position.

Evidence of this condition was presented in a recent speech to Air Force members and defense contractors attending a national airpower symposium. Secretary of the Air Force, Dr. Sheila E. Widnall, stated, “Because ours is a dynamic world with some harsh budget realities, we’re working hard to focus our role as the world’s premier air and space force” (73). The challenge, therefore, is to decrease defense spending, yet remain vigilant in protecting U.S. national interests.

Research Objective

The primary research objective is to review past and present armaments cooperation practices and policies from the post-World War II era up to the present, as well as the views of current senior Department of Defense officials, as a means of concluding whether or not the use of international armaments cooperation for major defense systems will be a valued alternative for the U.S. in an era of declining defense budgets.

The research investigation consists of a literature review on both historical and current information related to International Armaments Cooperation Programs (IACP) and personal interviews with some of our nation's top defense experts. Both methods of investigation will attempt to show a greater tendency for the U.S. to move toward the use of International Cooperative Development (ICD) for future defense systems acquisitions.

In order to reduce redundancy in the conversational tone of the writing, the terms International Armaments Cooperation Program (IACP) and arms cooperation; and International Cooperative Development (ICD) and cooperative development, are often used interchangeably throughout the thesis. There is no intended implication for using one phrase over another in a particular sentence--the reason is purely stylistic. Also, to bring the highest degree of clarity to this thesis, a list of acronyms and their meanings, and a glossary of terms can be found at the end of this thesis.

Research Questions

Research questions were designed to focus the research effort around past-, present-, and future trends in cooperative development. The research questions that lead to a focused literature review and the development of the interview research questions found in the interview protocol (see Appendix H) are:

- A. How did international armaments cooperation evolve from the post-World War II era to the present?
- B. What are the current policies, practices, and major programs involved in international cooperative development (ICD)?
- C. To what degree will international armaments cooperation programs be involved in the development and production of weapon systems in the future?

D. Has a baseline model been developed to guide the acquisition process of major weapon systems that are international cooperative programs?

These questions provoked an in-depth literature review on the historical evolution of cooperative development from post-World War II to present. The thesis research questions and the associated interview research questions also elicited a rich blend of responses from senior DoD leaders during the interview process. The combination of the literature review conducted in Chapter III and the responses to the research interview questions in Chapter IV were used to formulate the conclusions and recommendations found in Chapter V.

Definitions and Objectives of International Armaments Cooperation

Definitions. There are many different definitions that encompass the multi-faceted nature of international armaments cooperation. Some definitions address a broad range of programs that fall under the umbrella of defense cooperation, such as foreign military sales or engineer and scientist exchange programs, where other definitions are more specific and only address a particular project or agreement. The next few paragraphs define the broader forms of cooperative development to give the reader a general understanding of international armaments cooperation. These definitions represent the building blocks of a concept that, from its inception after World War II, charted a new direction for weapons systems development and acquisitions.

1. Defense Cooperation. "A generic term for the range of activity undertaken by the DoD with its allies and other friendly countries to promote international security [which] includes, but need not be

confined to, security assistance, industrial cooperation, armaments cooperation, foreign military sales, training, logistics cooperation, cooperative research and development, foreign comparative testing, and host nation support.” (16)

2. International Armaments Cooperation Programs (IACP). These programs represent specific cooperative projects and have one or more countries participating. Projects include areas of cooperation, such as (a) research, development, testing, and evaluation (RDT&E) as well as joint production and procurement; (b) data, information, and personnel exchange activities; and (c) testing and evaluation of conventional defense equipment, munitions, and technologies. (13:713)

Objectives. While the definitions provide the reader with a broad understanding of armaments cooperation programs, the objectives relay specific goals and intentions of participating in such programs. Objectives answer questions such as, Why cooperate? Or, what benefits are realized from such partnerships? Collectively, the core objectives of armaments cooperation describe the ability “to increase military effectiveness through standardization and interoperability and to reduce weapons acquisition cost by avoiding duplication of development efforts with our allies” (36:1-2). These objectives attempt to explain the value of armaments cooperation.

There are many objectives of cooperation. And while they often overlap when considering the larger picture of cooperation, objectives can be as specific as the treaty, program, or project they pertain to. Following is a discussion of cooperative objectives, as they pertain to armaments cooperation.

During a 1993 Armaments Cooperation Steering Committee meeting, then Secretary of Defense, William Perry, identified seven armaments cooperation objectives:

- 1) Deployment and support of common, or at least interoperable, equipment with U.S. friends and allies;
- 2) Leveraging our resources through cost sharing and economies of scale afforded by coordinated research, development, production, and logistics support programs;
- 3) Exploitation of the best technologies, military or civilian, available for equipping the U.S., its allies, and other friendly nations;
- 4) Supplying the best available defense material to the U.S., its allies, and other friendly nations in the most cost effective manner;
- 5) Maintenance of a strong industrial base for the U.S., its allies, and other friendly nations;
- 6) Promoting the integration of environmental, safety and occupational health considerations into U.S., allied, and other friendly nations' defense planning;
- 7) Enhancing national security strategies of modernizing and strengthening existing alliances and friendships while reaching beyond traditional allies and friends, by increasing transparency in armaments and improving understanding. (36:1-3)

An even simpler presentation of the objectives of armaments cooperation was made by Mr. Robert Bruce, Director of Armaments Cooperation Atlantic, Office of the Under Secretary of Defense for Acquisition and Technology, in a briefing for the Advanced International Management Workshop. He categorized the aims of multilateral armaments cooperation under four separate headings:

- 1) Operational. Interoperable systems with allies and coalition partners, broader military-to-military contact, and shared logistics and support in combined operations.
- 2) Economic. Shared research and development cost on new systems, reduced production costs through economies of scale, reduced support costs in foreign theaters through shared infrastructure & logistics.
- 3) Technological. Access to the best global technologies.

- 4) Political. Strengthen political fabric of Alliance relationships and use technology cooperation as incentives for arms export restraint. (5)

Chapter Summary

Given the increased costs associated with keeping America free and the world safe for democracy, it is not surprising that the Department of Defense is exploring different avenues to reduce defense spending without compromising national security. By reviewing literature on past armaments cooperation efforts, current practices and policies of U.S. international armaments cooperation, and discussing how these practices and policies might impact the future of international armaments cooperation with some top personnel in the Department of Defense, it is clear that international cooperation has played a significant role in shaping the future of defense systems acquisition.

This thesis discusses the evolution of U.S. international armaments cooperation, U.S. practices and policies, and presents information that supports an even greater importance of international armaments cooperation for future U.S. defense systems acquisition efforts.

II. Methodology

Chapter Overview

The methodology describes the research process that was carried out in order to meet the research objective defined in Chapter I. It reports the methods of research selected to satisfy the research objective and provides justification for choosing these methods. In addition, it takes the reader through each step of the research, or data collection process, giving a step-by-step account of how information was gathered, organized, and reported.

The chapter begins with the research approach. Here, the research strategies used to collect and review data for the thesis are revealed. Two strategies were chosen to meet the research objectives: archival and historical analyses. Both analyses acquaint the reader with *what* is being analyzed. In addition, this section introduces the theory of triangulation to accomplish the research. Following the approach is the justification. This section explains *why* these particular research methods were selected.

The third part of the methodology is the data collection process, which describes *how* the research was carried out. It discusses the steps taken to gather information on cooperative development, present it, and report any significant findings. And finally, the chapter summary completes the methodology. It ties each section together, presenting a summary of the investigation process used to assess future possibilities of cooperative development in the acquisition of major U.S. defense systems.

Research Approach

Another way of referring to this section is the “research strategy.” This strategy represents the approach taken toward selecting different sources and types of information so that questions can be answered through research. “The most important condition for selecting a research strategy is to identify the type of research question being asked” (74:19).

In this case, the types of research questions being asked were exploratory in nature and would elicit qualitative responses. “Qualitative research is a rich means of exploring important issues in depth and breadth and involves contact with the people being studied in their surroundings” (69:595). Thus, the research conducted was qualitative research that focused on how cooperative development evolved in the past, what its status is today, in the post-Cold War era, and the likelihood of it becoming the avenue of choice for future major weapon systems acquisitions.

By organizing the research around past, present, and future cooperative development issues, a strategy for the research process was developed. There are several different types of qualitative research strategies. In order to meet the research objectives of this thesis, however, the selection was narrowed down to two qualitative strategies: archival analysis and historical analysis. The reason these strategies were selected above others directly correlates to the historical qualities of the overall thesis. Theories linked to choosing these strategies to meet research objectives are described below.

By selecting an archival analysis, the researcher could explore various public records and government documents. The exploratory nature of an archival analysis is

appropriate for this research task (74:17). Congressional reports and budget studies, as well as interviews with key defense personnel and speeches made by America's leading defense officials served the purposes of the archival analysis insofar as they contained information on policy, programs, and trends that explored *what* was happening of significance in the international armaments cooperation arena and related areas of study.

The archival analysis proved to be an important and fruitful research strategy, as the answers to the research questions substantially drew upon information contained in public records and historical sources.

The historical analysis was also a valuable approach to conducting qualitative research for this thesis, as it sought to trace events over time in a descriptive and explanatory manner (68:122). Since these events are a part of history, they can only be described, not changed. The researcher, therefore, has little flexibility using this strategy. Nevertheless, using a historical approach was instrumental in uncovering past events to chart the evolution of arms cooperation. In addition, a historical analysis provided an accurate account of *how* international armaments cooperation unfolded. It accomplished this objective by examining the relationships between events and creating a timeline for progress. The current status of arms cooperation can be better understood by tracing this timeline of events, because each new program, policy, legislation, or practice introduced over time served to shape the nature of international arms cooperation today.

These strategies involved using two methods of research to gather information on historical and current cooperative development issues, as well as soliciting facts and opinions about the future of international cooperative development. These two methods

included a literature review and personal interviews. Both methods intended to satisfy the research objective of supporting international armaments cooperation programs as an alternative to costly acquisition practices for major weapons systems. The practice of combining methodologies to study the same phenomenon or program is known as “triangulation” (65:187). Usually, the motivation for using triangulation in a study is to strengthen the approach or design. This makes sense, as it logically implies that a cross-study of a single topic is more reliable or valid than examining the topic with only one method of study. “Studies that use only one method are more vulnerable to errors linked to that particular method (e.g. loaded interview questions, biased or untrue answers) than studies that use multiple methods in which different types of data provide cross-data validity checks” (65:188).

The research conducted for this thesis incorporated two types of triangulation: data triangulation and methodological triangulation. Data triangulation occurs when a diverse number of data sources are used in the study, where methodological triangulation means using various methods to study a single problem or program (65:187).

Data triangulation involved using both primary and secondary sources to meet the research objectives. Primary data sources are original or first-hand sources of information. Examples of primary sources include public records and personal interviews. Secondary sources are considered studies or accounts completed by others, which reflect their interpretation of the data (61:15), such as political science texts, industrial publications, and various periodicals that relate to the topic. The data sources

used for this thesis reflect a wide variety of both primary and secondary sources (see Bibliography for a complete listing of sources).

Evidence of methodological triangulation is illustrated by the use of two methods of conducting research. The first method of research was the literature review. Various texts, periodicals, briefing documents, handbooks, manuals, magazines, pamphlets, Internet sources, and regulations were consulted to write the literature review. A study of pertinent information sources unveiled the history of cooperative development from World War II up to the current, post-Cold War environment. This history is limited to cooperation between the U.S. and Europe, as the majority of cooperation during this time took place between these two regions. In addition, this review included a discussion of up-to-date policies and programs that are at work today to shape tomorrow's cooperative partnerships.

Conducting personal interviews was the second method used to gather information related to cooperative development with allied nations. One-on-one discussions with senior members of the DoD, Air Staff, and key personnel within two Air Force Materiel Command Centers, were a rich source of information on current programs and policies, as well as insightful perspectives about the future of international armaments cooperation programs (see Appendix A for a complete listing of interviewees and their position titles). U.S. defense leaders openly shared their views on the benefits and challenges of cooperative development projects, and they freely commented on the degree that they believed cooperative development will be utilized for developing and producing large-scale defense systems in the future.

Both methods of research supplied substantial amounts of information that was valuable to the thesis. By collecting and reviewing a wide variety of relative documents and developing a long list of interview candidates, the research strategy revealed a consensus of the facts, as well as future trends in cooperative development. "Multiple sources of evidence essentially provide multiple measures of the same phenomenon" (74:23). The phenomenon analyzed in this thesis is cooperative development, and through the use of a literature review and personal interviews with DoD leaders, the potential of international armaments cooperation programs becoming a primary avenue for major weapon systems acquisitions in the future was explored.

Justification

These two research methods, a literature review and personal interviews, were selected to provide both historical and current information on cooperative development, including past practices, and current policies and programs. Another reason for choosing these methods was to forecast the utility of international armaments cooperation programs in future weapons systems acquisitions.

As mentioned in the research approach, the research questions driving the overall investigation of international cooperative development were exploratory in nature, and therefore anticipated qualitative responses to the questions. A strategy was developed to answer the research questions to include a literature review and personal interviews. Further justification for selecting these methods is presented in the next few paragraphs.

The literature review contributed an abundant variety of sources on cooperative development issues. These sources include reports on armaments cooperation, texts on

security strategies and economic alliances, recent DoD statements made before Congress, Congressional Budget Studies (CBO), unpublished DoD briefings, trade journals, and the 1997 Quadrennial Defense Review (QDR) (see Bibliography for a listing of sources).

This method proved to be an instrumental tool in the research process. A consultation of over fifty different documents uncovered past motives and methods of cooperative development, championed the benefits of such projects, emphasized the challenges associated with cooperative endeavors, and drew conclusions about the prevalence of international cooperative development in future arms procurements.

Both the history and reality of launching cooperative programs came into sharp focus by conducting research in this fashion. A broad range of issues were explored to fully investigate the prospects of a cooperative future for arms development and acquisitions. Examples of these issues include official step-by-step guidance on forming cooperative partnerships with allied nations; economic references that chart defense spending trends among NATO countries over the past forty years; aerospace publications that discuss the internationalization of the defense industry; and congressional reports that describe the objectives of particular cooperative programs.

Together, these fifty-plus sources trace the evolution of cooperative development from the post-World War II era up through the 1990s, covering many of the integral political, economic, and technological issues associated with international cooperative development programs. Facts, opinions, speculation, ideas, and assumptions about such programs abound in these sources, providing the multiple measures of cooperative

development issues necessary to construct a timeline of past and present cooperative development efforts.

Personal interviews promised insight to many aspects of cooperative development, such as motives for developing cooperative partnerships, obstacles that impede collective success, and how often cooperation will be sought out in the future as a means for developing complex weapon systems.

One-on-one interviews are included in the category of "qualitative assessments" when an interviewer expects to collect a substantial amount of information from a particular individual (10:3). The personal interviews conducted for the purpose of this thesis aimed at soliciting the latest information and speculation on international cooperative development, which only the most senior defense officials would be privy to.

"Qualitative research has a diagnostic value" (10:3). This was one important factor for deciding to personally interview senior DoD leaders. One objective of conducting interviews was to ascertain what the future looked like for international armaments cooperation programs. In other words, the interviewees were asked to "diagnose" the utility and popularity of these programs for the future.

Although conducting personal interviews does not cover the broadest range of feedback possible, as does a widely disseminated questionnaire, such interviews lent substantial insight to the political and economic intricacies of programs and gave reliable information regarding the direction these programs will take in the future.

The criteria for choosing interview candidates was based on the individual's degree of involvement in the cooperative development process. Qualities such as depth

of knowledge and breadth of experience pertaining to the subject matter were important factors in the selection process. The interviewees invited to participate represented numerous levels of the defense department hierarchy, as well as most of the positions tied to the cooperative development process (see Appendix B for the OSD Organizational Chart). This pool of respondents brought with them a multitude of experiences and a wide scope of knowledge to the interview table. They are all experts in their field and have decision-making power or influence in the realm of cooperative development (see Appendix A for a complete listing of interviewees and their position titles).

Data Collection Process

Collecting data "involves reducing accumulated data to a manageable size, developing summaries, looking for patterns, and interpreting findings" (25:89). Primary and secondary sources containing information on U.S. and European cooperative development efforts from the post-World War II era to the present were collected and studied in order to assess the likelihood of international armaments cooperation programs playing an increasing role in the acquisition of U.S. defense systems.

The initial search for published resources specifically related to cooperative development was conducted by scanning the Internet and using on-line catalog systems for both Air Force and local university libraries. In addition, weekly, monthly, and quarterly publications were routinely reviewed for current data relating to the topic. As the resources were collected and reviewed, they were arranged in a chronological fashion. This way, the historical literature review would be consistent with international

cooperative development issues as they unfolded from post-World War II up to the present era.

Next, a list of potential DoD candidates for personal interviews was developed. The list started out with the Honorable Arthur L. Money, Assistant Secretary of the Air Force for Acquisition. Through referrals from his office and a brief investigation on the internet, the list grew to include nineteen names and represented many of the senior DoD officials actively involved in international armaments cooperation.

Interviews were set up over a four-day period. The sequence of interviews was in no particular order; availability and convenience of senior personnel were the driving factors of the interview schedule. Seventeen of the candidates were based at the Pentagon or in the Washington D.C. area, and the remaining two candidates worked in offices at Wright-Patterson Air Force Base. All of the interviews were conducted on-site in the interviewees' offices.

Data collection for personal interviews consisted of several steps. First, an interview protocol was developed to facilitate the interview process (see Appendix H). This product consisted of four primary sections: 1) background information, 2) thesis research questions, 3) interview research questions, and 4) supporting interview research questions. The thesis research questions, mentioned in Chapter I, channeled the flow of research in three areas: past-, present-, and future cooperative development issues. Where the thesis research questions were intended as a guide for writing the literature review, the interview research and supporting interview research questions were designed exclusively to gather information through the interview process. Having pre-planned

interview questions helped to focus and standardize each interview. The interview protocol was faxed to all confirmed interview participants approximately three days before the interview took place. This allowed each interviewee to review the questions and, if necessary, gather speeches and other documents that could advance the research effort.

During the interviews, introductions were exchanged and an overview of the interview format was presented to the interviewee. Some interviews closely followed the format, while others started with the intended format and departed from it. Often, answers given by interviewees raised other questions, offering even greater insight to the practices and programs of cooperative development.

Each interview was tape recorded in order to maintain the accuracy of the interviewee's comments. Using a tape recorder also eliminated other distractions that might have occurred if the interviewer was only taking hand written notes. While all of the personnel interviewed permitted the recording of the interviews, many qualified certain statements by asking that they not be quoted on particular claims, dollar figures, etc. Being experts on the issues of international cooperative development, or related topics, many interview participants suggested other areas or references for further research that would provide valuable insight into the topic.

Many interview participants contributed extra materials to the research effort, such as briefings that they had conducted, DoD documents, handbooks, and reports. The printed materials that the interviewees provided were later reviewed and arranged in a manner consistent with the literary sources discussed earlier. This information was

especially helpful in developing the 1990s section of the literature review, as their contributions constituted the most up to date information available on international cooperative development matters. Finally, the recorded interviews were reviewed and incorporated into Chapter IV, Research Findings. The interviews constitute the speculative thrust with regard to the future role of cooperative development in the acquisition of major U.S. defense systems.

Chapter Summary

The research for this thesis required a qualitative methodology. Choosing research strategies and methods that would summarily address the problem of acquiring more expensive and technically complex weapons systems with fewer defense dollars, called for a review of past and present information on international cooperative development issues, as well as talking with defense policy makers. Archival and historical analyses were selected as research strategies for the thesis. Both strategies facilitated the research effort, as they helped reveal both the building blocks and the framework of international cooperative development. All of the information that was extracted from source documents gathered during the literature review and personal interview process were organized around past, present, and future trends in international armaments cooperation. The information gathered during the interviews with senior DoD officials was used to develop Chapter IV, Research Findings.

III. Literature Review

Chapter Overview

The purpose of this chapter is to trace the evolution of international armaments cooperation between the U.S. and Europe. Many of the events mentioned in this chapter are considered cornerstones in the foundation of current international armaments cooperation policy and programs with allied European nations. These events helped to shape present day practices of developing major weapon systems with American cooperative partners. Practices and policies guide the development of partnerships and programs. They dictate with whom the U.S. can cooperate, what it can build, and how to go about planning, organizing, and developing a cooperative product. The literature review begins by providing the reader with definitions of the major aspects of international armaments cooperation. Immediately following the definitions is an overview of the primary military and political objectives of armaments cooperation. The highlight of the literature review is a historical background of U.S. international armaments cooperation, charting the evolution of cooperative development between the U.S. and Europe. Starting with the post-World War II era and continuing through the present, this section gives the reader a chronological look at the stepping stones of international armaments cooperation.

Historical Background of U.S. International Armaments Cooperation

By reviewing the history of U.S. defense cooperation one can gain a better understanding of current international armaments cooperation efforts. The collaborative achievements of yesterday had far-reaching effects on the policies, programs, and practices of today's defense cooperation. Although early policy makers could not predict the collapse of the Soviet Union and the demise of Communism, they, at least, recognized the benefits of cooperative alliances to improve defense posture, reduce research and development costs, and strengthen political ties with U.S. allies.

Armaments cooperation spans several decades, growing more complex, yet more practical as defense budgets shrink and weapons systems modernize. Significant events or policy changes of each period mark the strides or setbacks of defense cooperation. As a whole, these time periods reflect the progress of armaments cooperation and lay the ground work for present-day cooperative efforts.

Post-World War II . Western European nations emerged victoriously from the Second World War, yet faced the awesome task of rebuilding their industrial bases. Although the United Kingdom was able to maintain its industrial defense capabilities, many of the continental countries of Europe, such as France, Germany, and Italy, had to completely reconstruct their countries' crumbled infrastructures and restore critical defense capabilities (37:107).

While the traditional approach of keeping arms production as an "in-house," or independent industry was clearly reflected in the foreign policies of allied nations, both

the U.S. and Europe had strong incentives to explore opportunities for defense cooperation (55:53). Europe desperately needed assistance to restore industrial defense capabilities to its nations, and the U.S. wanted to deter Soviet expansion by equipping Europe with effective defense equipment. For the U.S. knew that “economic weakness would be a breeding ground for communism in Western Europe” (53:167). Thus, an agreement appeared to be inevitable between Europe and the U.S. -- the question was, how would this occur?

Up to this point, U.S. arms sales to Europe were rare, and there was little policy to guide the execution of such sales. There were, however, early signs of defense cooperation, which, at the very least, “got the collaborative ball rolling”. Although in primitive form, defense cooperation was recognizable during the WWII, as the U.S. became a primary supplier of weapons and materiel to its allies (52:147). The Lend-Lease Act, passed in March of 1941, was as close to an official policy on arms cooperation as the U.S. came until the War ended. “Under lend-lease, arms worth tens of billions of dollars were transferred to the Allies between 1941 and 1945” (52:147). A form of military assistance, lend-lease arms were given or loaned to allied countries to reinforce European defense capabilities. As soon as the WWII ended, the steady flow of lend-lease arms to Europe came to a grinding halt.

The dust of war, it seemed, had barely settled when communist expansion and Soviet domination became a real threat to democracy. For this reason, the U.S. reconsidered its position on armaments cooperation with Europe. By arming allied nations with the necessary defense equipment, the U.S. would be in a position to

indirectly challenge any global objectives the Soviet Union might have. A vision of an allied force, with standardized defense equipment used to stifle communist aggression, quickly became the object of desire for the U.S.

The Birth of NATO and Early Cooperative Efforts. Although the U.S. initially struggled with the concept of entrusting national security to universal organizations (7:135), the threat of communist expansion caused the U.S. to reconsider the mutual benefits of forming an alliance with Europe against the Soviet Union. European thinking was not much different. As European countries began their journey toward industrial and economic recovery, they recognized the need for an alliance to serve as a political and military fortress to defend Europe against possible communist intervention (57:9).

As part of the 1948 Brussels Treaty between France, the United Kingdom, Belgium, Netherlands and Luxembourg, the North Atlantic Treaty Organization (NATO) was created. In June 1948, the United States Senate passed the “Vandenberg Resolution,” which formally expressed the desire of the United States to actively pursue a collective security alliance relationship with the signatories of the Brussels Treaty and support the efforts of the newly formed alliance (13:17). Finally, in April 1949, the U.S. officially became a member of NATO. This new alliance would forever change the traditional approach to security. What role the U.S. would play in this alliance, however, needed clarification.

Until the U.S. joined Europe and Russia in the World War II campaign to crush fascist aggression, American foreign policy, in terms of military assistance and global

security, did not reflect the U.S. as a superpower (7:134). Evidence of this fact can be found in the independence of American and European arms production, as well as the fact that the U.S. entered World War II late in the conflict. The U.S. did not initially feel obligated to fight, despite the fact it had wrestled with imperial aggression in the past (7:134). Up to this point, the dearth of weapon systems collaboration between the U.S. and Europe was indicative of the “uncooperative” nature of the defense industry. This does not suggest a lack of willingness among the regions, but rather a compliance with convention or an attitude of self-sufficiency. The effects of WWII changed this mindset. Not only did the U.S. begin to see itself as a world leader, it also began to look at global defense from an allied perspective:

World War II, however harrowing an experience, also presented the U.S. government with a unique opportunity to extend the influence of American institutions on a global scale. Prior to the 1940s there either had been strong nations to limit their ambitions or the American people had not desired to undertake the commitments necessary for the nation to play the role of the world superpower. With the crushing defeat the allies administered to Japan and Germany in World War II and the relative weakness of our allies, including the Soviet Union, there was no nation in 1945 capable of blocking America's ascendancy. Furthermore, the majority of American citizens had undergone a significant change in attitude about the importance of the United States taking a leading role in international affairs. (7:134)

What was significant about the attitude change that America underwent during World War II was the self-actualization process that accompanied the victory. By viewing and accepting itself as an international leader -- a superpower, America began to look at security from a more global standpoint. The domain of U.S. responsibility, with regard to defense, was no longer national. Democracies all over the world were

threatened by the possibility of communist expansion, and the U.S. had the technology and economy to preserve democracy from a distance -- to help others help themselves.

This new attitude is relevant to the issue of international armaments cooperation, as it signals a more cooperative spirit in supporting the defense efforts of other nations, even if this support is ultimately for America's own benefit. It is also indicative of how other nations perceived the U.S. -- as a superpower. Interestingly, that perception explains why the European NATO members formally requested military and financial assistance from Washington only one day after the U.S. became a member of NATO (52:147). Although the North Atlantic Treaty that created NATO did not necessarily focus on arms cooperation, two of its Articles referred indirectly to this concept. Article 2 states, "The Parties will seek to eliminate conflict in their economic policies and encourage economic collaboration between any or all of them." And Article 3 states, "The Partieswill maintain and develop their individual and collective capacity to resist armed attack" (72:99).

Bound to the agreements of NATO and having accepted its role as a superpower, America responded to this request in two ways: first, by sending arms and equipment to Europe in large quantities; second, by purchasing materiel and weapons from European manufacturers. Over the next 10 years, the U.S. would send nearly \$54 billion in assistance to Europe. Much of this aid was in the form of weapons to deter, contain, or thwart any potential Soviet aggression. Under the Mutual Defense Assistance Program (MDAP), the U.S. bought defense articles from Europe, pumping valuable U.S. dollars into the European defense industry to bolster its economy. While this response may

appear to only benefit Europe, in reality, the U.S. could take advantage of cheaper production and transportation costs (52:147). A long list of programs, marked by various acronyms and abbreviations, represented subsequent agreements to transfer or purchase arms within NATO. While discussing the features of each program is not the purpose of this thesis, it is important to realize the extent of cooperation that occurred as a result of NATO.

Over the next few decades, American foreign policy reflected a U.S. commitment to rebuild Europe's industrial base. The next section describes the features of those policies, as well as how they were manifested in cooperative programs.

The 1950s. During the late 1940s through the mid-1950s, the U.S. supplied surplus arms to the military forces of its NATO allies. In addition to logistics equipment, the U.S. supplied Europe with advanced weapon systems, such as fighter aircraft and tanks. Because the U.S. was the primary supplier of these weapon systems, standardization of defense equipment was an added benefit of the agreement. "During the early post-war years, NATO's effort to create an arsenal characterized by rationalization, standardization, and interoperability (RSI) of weapon systems was based on European imports of U.S. defense goods" (51:6). This meant that if NATO countries were mobilized to fight, their collective war effort would be enhanced by standardized equipment and logistics systems -- a concern that many theorists had with regard to an allied fighting force (72:99).

In addition to strengthening the military might of Europe, U.S. assistance helped to restore the region's defense industrial capability. This was largely accomplished

through U.S. grants, purchase orders, and arms cooperation (72: 99-100). The first method was purely monetary, where the second one meant the U.S. purchased some materiel and weapons from European manufacturers (52:147). The last method began in the early 1950s, and it became so common, “that by the late 1950s a shift began from transfers of military equipment to European countries, to licensed production of American defense products in those countries” (37:107). This type of armaments cooperation occurs when the system design is transferred from the original manufacturer to a manufacturer in the country that desires to produce the system. For Europe, some of the early licensed production efforts can be seen in Table 1 on page 29 (72:15).

From the perspective of equipment standardization, these agreements supported and promoted broad-based planning for standardized defense equipment. A few defense planners even pushed for a master plan to equip all of NATO, delegating production to the most efficient sources. The plan, however, was laden with conflicts of economic interest, where each country desired to maintain industrial production levels. Partitioning production loads would mean moving production out of many countries, leaving an economic vacuum in the former host nation. Hence, broad-based planning initiatives for an all-allied force were abandoned in their infancy (72:100). This did not necessarily mean, however, that armaments cooperation failed. International armaments cooperation continued to be a focus for both the U.S. and Europe; it just occurred within individual projects, versus mass defense planning.

Table 1. Armaments Cooperation of Major Weapon Systems—1950-1970

Major Licensed and Co-Production Arrangements				
Type of Equipment	Name	Country of Design	Countries Involved in Production	Decade Commenced
Licensed Production				
Fighter Aircraft	Hunter	UK	BE, NL	1950s
	F-104	US	FRG, BE, CA, NL, IT, JA	1950s
	F-4	US	UK, JA	1960s
	G91	IT/UK	FRG	1960s
	F-5	US	CA, SP	1960s
main battle tanks	M48	US	IT, FR	1960s
	Leopard 1	FRG	IT	1960s
	M48 updates	US	GR, TU, SP	1970s
Missiles	Hawk	US	FR, BE, FRG, IT, NL	1950s
	AIM 9B (Sidewinder)	US	BE, FRG, DK, GR, NL, NO PO, TU	1960s
	AS 30	FR	FRG, UK	1960s
	SeaSparrow	US	DK, IT, NO, BE, NL, CA	1970s
Torpedoes	Mk44	US	FR, IT, CA	1960s
Artillery	M109	US	NL, NO, IT	1960s
	76 mm naval	IT	US, SP	1970s
Co-Production Arrangements				
Fighter aircraft	F16	US	DK, BE, NL, NO (and later GR and TU)	1970s

LEGEND: BE (Belgium), CA (Canada), DK (Denmark), FR (France), FRG (Federal Republic of Germany), GR (Greece), IT (Italy), JA (Japan), NL (Netherlands), NO (Norway), PO (Portugal), TU (Turkey), SP (Spain), (72:15).

In order to standardize weapons throughout the U.S. and Europe, armaments cooperation consisted of limited production of defense equipment. Also, greater interoperability was achieved during this period, as NATO began an effort to standardize war-time equipment components such as small arms (72:100). Finally, broad-based planning and cooperative endeavors throughout the decade forced all allied countries to

rationalize the number of new developments incorporated into defense planning. In combination, RSI sought to shape a more efficient allied force.

The significant advancement of this period was clearly licensed production of U.S. weapon systems in allied countries. Licensed production occurs when a U.S. design or product is permitted, under commercial agreement, to be manufactured in a foreign country. The technical information needed to construct a weapon system is transferred to a foreign government or manufacturer so that the weapon system can be built outside the U.S. As a whole, these efforts attempted to accomplish at least three fundamental objectives in the 1950s and beyond: first, joint production helped to re-establish the military defense capability of the European countries; second, it served as a means of rebuilding the defense industrial base of Europe; and third, it increased the Rationalization, Standardization and Interoperability of the members of NATO.

Rationalization, Standardization, and Interoperability are frequently used terms that refer to the aims of cooperation. While they are considered objectives of armaments cooperation, they also describe how cooperation is achieved. In other words, RSI is the “why” and the “how” of cooperation. Rationalization attempts to reduce the development or introduction of new defense systems that overlap systems already in use. This concept logically implies that cooperative partners should be rational about starting up new programs for developing major weapons systems when there are already so many out there. Standardization recognizes the importance of using common defense systems among allied nations. With standardization of weapons systems and defense equipment, an allied force can exchange spare parts or refuel a jet without worrying if one country’s

spare parts function in the other's machine, or if the fuel type is consistent with the other country's aircraft. Interoperability occurs when the defense systems of one country can function simultaneously with the defense systems of another country. In other words, radio frequencies or radars should not cancel or jam each other during an allied defense campaign (72:25).

The 1960s. As Western European nations recovered from WWII, they began designing and producing military weapons for domestic use and export. Though they did not enjoy the same economies of scale as the U.S., their military industrial bases regained enough strength to be in a position to compete with the U.S. in the foreign military sales (FMS) arena.

During the 1960s, it became apparent that the control and influence the U.S. had during the period of European recovery was no longer viewed as acceptable by European leaders who now had begun to push for increased production rights and offsets from the U.S. government (51:6). “Offsets are agreements made by the DoD to purchase foreign items to offset some specific amount or percentage of that country’s expenditures in the U.S. for U.S. defense items” (16).

By the mid 1960s the European defense industry had largely succeeded with its industrial rehabilitation and become a leading competitor in the once U.S. dominated European arms markets of NATO (51:8). The concerns of achieving RSI were minimal during the early stages of European recovery. This was largely due to the heavy transfer of U.S. military equipment to the region. However, as the production capabilities of the European defense industry heightened, the increased sale of European defense systems

throughout the region challenged the NATO goal of achieving greater interoperability among its military systems.

Increasing national concerns for political independence were at the root of the overlapping arms production capabilities that were generated. Economic concerns were equally important, particularly in the creation of domestic jobs and the development of high technology industries. One result has been that many countries must develop export markets for their products in order to achieve efficient production runs. This has had the negative effect of replacing a dependence upon defense imports, with its negative national security implications, with a dependence upon exports of defense products, with associated negative foreign policy implications. (55:53)

A successful European military industrial base meant declining U.S. armaments exports to the region. In 1963, as a result of decreased sales of military systems and increased research and development costs, the U.S. signed bilateral cooperative research and development agreements with France, Germany, Italy, and the United Kingdom in an attempt to seek new ways of spreading the financial and technical risks associated with the weapons acquisition process (37:111). This shows that, despite a shift from a collective mindset to a national one, international armaments cooperation was still a primary goal between the U.S. and Europe. However, this goal was more about strengthening the industrial and technology bases of Europe than it was about political alliances.

In spite of the challenges, the 1960s witnessed an overall explosion of cooperative programs, especially in the aerospace industry. One standout was the production of the U.S. F-104 Starfighter in Canada and Europe, “which eventually represented 25 percent of the front-line fighter aircraft in Europe” (72:101). Other examples were the French-designed Atlantique wartime patrol aircraft and the AS-30 air-to-surface missile. Many

of these projects took place outside of the NATO planning structures, yet nevertheless, they were considered celebrated achievements of arms cooperation. The reason these projects progressed outside of NATO was because the NATO planning structure required agreement on numerous basic operational requirements -- a requirement that hindered cooperative success when multiple nations were involved (72:100-101).

Under the NATO Basic Military Requirements (NBMR) system which got underway in the early 1960s, nearly 50 statements of basic requirements were agreed to. Unfortunately few of them resulted directly in the development or production of specific equipment. The problem was that in reaching an agreement between 12 or more countries an NBMR was drawn up which suited few of them, and economic and political factors also came into play. (72:100)

Such early attempts to establish detailed agreements on fundamental operating requirements resulted in cooperative failure rather than success. Thus, international armaments cooperation began to follow a less rigid path of planning and production.

Indeed this period saw an intense effort in the area of arms cooperation, but it also permitted a loosening of the former specifications outlined in NBMRs. In 1966, a new charter was developed by a body of NATO armaments directors. This charter emphasized "that individual nations were responsible for equipping their armed forces but encouraged them to work together project by project with support (but not regulation) by NATO's central structures" (72:101). Given this guidance, it is not surprising that arms production grew very competitive among NATO countries. While the U.S. was losing market share in Europe, it was still enjoying the greater economies of scale associated with the research and development of new weapon systems. Because many European countries could not compete with the U.S. in these areas, they began to explore

other cooperative opportunities. Thus, countries “continued to have independent strategic interests outside the NATO orbit” (51:8).

By the end of the 1960s, many of the strategic goals of NATO were set aside to fulfill the more profitable agendas associated with exporting weapons. Foreign policies were influenced more by economics than the political threat of Soviet domination. A full scale war with the Soviet Union was still only a possibility. Consequently, marketing and selling weapons abroad superseded the allied goals of RSI. This “overlap in weapons programs and the lack of NATO standardization resulted in a tremendous waste of financial resources and military inefficiency that could prove fatal on the battlefield” (51:9).

The 1970s. In the 1970s, the reality of NATO’s ability to win a war hit hard. The earlier goals of RSI among NATO allies were far from being realized. Considering the lack of weapons standardization within NATO and an inability to achieve their desired level of interoperability, the U.S. Congress and Department of Defense began making plans to further promote RSI among U.S. allies (13:437). This concern was shared by major NATO commanders who would actually lead the fight against the Soviets should a war start. Their primary complaint was the “proliferation of competing U.S. and European equipment types, which both hindered military interoperability and appeared a waste of resources” (72:101-102). Something needed to change, or allied military attempts at stifling communism might fail.

International armaments cooperation programs became the leading vehicle for achieving greater RSI among allied forces. As mentioned earlier in this discussion, arms

cooperation programs had occurred to some extent in the years following WWII. Programs such as the Mutual Defense Assistance Program and licensed production of weapons systems in foreign countries represent early forms of arms cooperation. However, these programs took place on a smaller scale than succeeding ones. According to one source, “serious attempts at cooperation in the field of armaments did not begin in earnest until the 1970s” (13:437).

Beginning in the mid-1970s, the United States and its European allies began to focus on developing policies that addressed the increasing need for weapons cooperation if the RSI goals of the NATO alliance were to be recognized (17:2-1). A series of bilateral procurement Memoranda of Understanding (MOUs) were signed between the United States and most allied countries to facilitate the purchase of weapons systems among these nations (37:111). These agreements, though informal, obligated one allied country to purchase weapons from another allied country. By limiting the market in this way and cooperating with allied partners on the purchase of weapons systems, greater standardization and interoperability could be achieved.

This reciprocal trade was the start of a “two-way” street in armaments development and sales (55:54). A “two-way street” refers to a philosophy that encourages the U.S. to buy and sell arms with NATO allies (16). However, the European countries who participated in the procurement of U.S. systems quickly complained of a “one-way street” of weapons purchases that primarily flowed from the U.S. to Europe (72:13). The European argument was that the U.S. was not purchasing military systems from Europe at an equal rate. Thus, the “two-way street” was largely

considered a political failure. Judging from Figure 1 below, it is not surprising that European allies found the scales to be unbalanced.

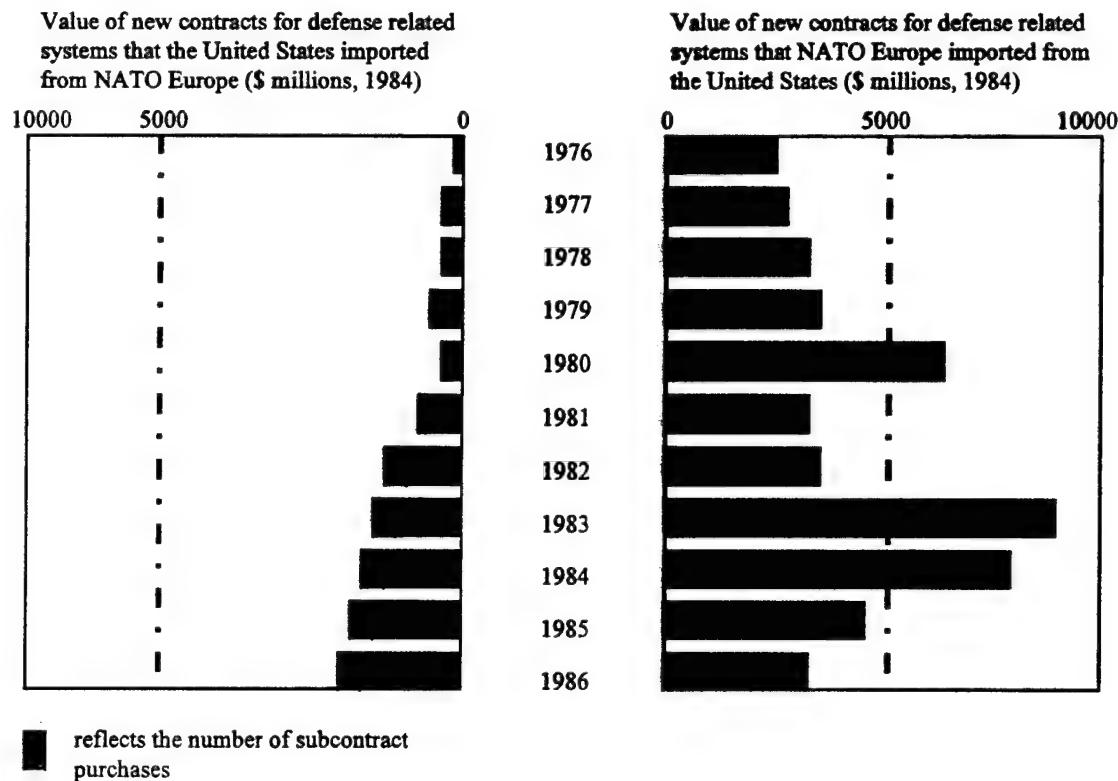


Figure 1. "Two -Way" Street--1976 to 1986 (72:12)

By 1976, the U.S. concern over NATO's standardization of systems, interoperability, and the re-opening of the "two-way" street with Europe was increasing (8:208). Several significant actions were taken by the U.S. to demonstrate a renewed commitment to strengthening NATO through RSI efforts.

In order to create more opportunity for licensing and co-production of military systems, and as a catalyst to accelerate European efforts to achieve armaments collaboration among the members of NATO, Congress passed the "Culver-Nunn" Amendment to the DoD Authorization Act of 1976 (17:2-1). This amendment was

considered the first major attempt by the U.S. to further the cause of RSI among NATO allies. "It defined as the policy for the U.S. Government that U.S. forces should have equipment standardized or at least interoperable with that of the forces of our NATO allies. It also established a U.S. Government procurement policy that permits the purchase of foreign made equipment to further RSI goals" (13:438).

Another significant milestone in achieving RSI occurred when the U.S. Congress permitted the Defense Secretary to waive the "Buy American Act". This Act provides that the U.S. government give preference to domestic end products (16). An acknowledgment of the successful development of the European military industrial base and a need for greater U.S.-European cooperation and standardization, the act instructed the Secretary of Defense to waive the "Buy American Act" when there was an acceptable European system available that served the same purpose (8:208).

In keeping with a renewed commitment to NATO and RSI, the U.S. decided to increase the testing of foreign made weapon systems before launching new costly domestic developments. Also, a concept known as the "Family of Weapons" was introduced to standardize the production of arms, "whereby the United States and Europe would divide up development of a group of weapons" (72:102) (see Glossary of Relevant Terms for a description of this form of armaments cooperation).

Despite the attempts by the U.S. government to increase RSI within NATO through IACP, little overall progress was made. Obstacles to standardization continued to be the individual focus that each country placed on economic and military requirements. What seemed to benefit two or three nations economically or militarily

would negatively impact the others (8:212). While international armaments cooperation programs were better utilized during this period, the goals of RSI were still not reached. The poor status of standardization within NATO is captured in the following paragraph:

Today, the alliance may be standing at the crossroads of standardization. Although all member nations recognize the need for greater arms cooperation and increased standardization, any long-term success is contingent upon a much stronger political commitment to general cooperation as a whole. At the present time it is generally recognized within the alliance that complete standardization of military equipment...is an ideal that is neither practical nor desirable. In the future, NATO will concentrate on those cooperative equipment programs that are economically and militarily efficient, particularly in the reduction or elimination of duplicate programs and production procurement waste. (8:212)

The search for U.S.-European standardization of weapons produced some very determined efforts in the first thirty years following the post-WWII era, yet yielded only marginal success in terms of armaments cooperation and standardization (17:2-3). While standardization was a desired outcome in U.S.-European armaments cooperation during this time, a U.S. House Committee on Armed Services stated in the 1977 NATO Standardization, Interoperability and Readiness Report that the DoD's definition of standardization and interoperability concepts are ambiguous and elusive, and as a result, have produced "confusing and often conflicting guidance for translating policy into action" (8:200).

It appeared that NATO countries faced two challenges: RSI and gaining market share in the defense industry. The first challenge was a collective goal, where the second was viewed from a national perspective. Many believed that solving one meant aggravating the other. How could NATO standardize its equipment if individual nations

were preoccupied with gaining or losing market share? For now, it seemed that both challenges continued to be pursued separately. However, there were some exceptions, where a superior weapon systems was developed and coproduced in NATO countries. Perhaps one of the best examples of such a weapon system was the American F-16.

General Dynamic's F-16 lightweight fighter aircraft was a coproduction success story. Belgium, Denmark, the Netherlands, and Norway all opted to participate in the F-16 program, which gave these countries access to advanced technologies, and offered European aerospace companies a number of different supply-related defense contracts. The F-16 program was considered a tremendous advancement in the arms cooperation arena. Participating European countries enjoyed joint venture opportunities and licensed production of a superior weapon system, and the U.S. was able to gain market share in European defense industry (52:166). Some European observers were dismayed with the F-16's success, as they believed that the U.S.'s primary objective for introducing this program to Europe was to divide and conquer Europe's defense market. Further, critics of the F-16 program claimed that "by engaging at least some NATO countries in attractive coproduction deals, the United States could weaken major competitors and retain dominance over European industries" (52:167). This view was one of many reasons why some European NATO countries decided to combine their efforts in support of European-produced defense products.

In the latter half of the 1970s, European allied nations formed an alliance known as the Independent European Programme Group (IEPG). The purpose of this organization was to promote arms cooperation on specific European projects. Together,

these countries could pool their funds and technological expertise and enjoy improved economies of scale and a more competitive posture in the arms market. Working separately, these countries had no alternatives to off-the-shelf procurement of equipment from the U.S. -- they could not afford such alternatives. However, working as a cohesive group, they could meet the costs associated with arms development and production (72:102). According to another source, IEPG objectives also included an increase in the purchase of European equipment by the U.S. and a greater degree of standardization among European arms. This initiative was a significant advancement in cooperative policy, as "it demonstrated a European commitment to the maintenance of *national* defense industries based on *collaborative* as opposed to *competitive* defense projects" (51:11-12).

By the end of the decade, European collaboration was gaining momentum while the U.S. was quickly losing its European market share (51:12). The Trade Agreements Act of 1979 opened up the U.S. arms market to signatory countries who reciprocated by opening their markets up to the U.S. Now, American domestic contractors would no longer be favored over foreign ones, creating an even playing field for arms procurements (17:1-3). Yet despite their competitive arms industries, the countries of NATO still stood strong in their political commitment to protect democracy against the threat of Soviet aggression. Given this condition, arms cooperation program continued to emerge at an increasing rate.

The 1980s. This decade witnessed a renewed thrust in the direction of international armaments cooperation programs (IACPs). This time, however, it appeared

that the motivation had more to do with sound economic practices, than a strong political alliance. Initially, U.S. defense policies focused on rebuilding allied arms industries, which in effect strengthened the U.S. political alliances. But, when the same allied industries that the U.S. helped to resurrect began to compete with the American defense industry, defense policies changed. “U.S. policy priorities have now shifted to some extent to include concern with the national economic implications of collaborative efforts” (56:45). Legislation was introduced to maximize the economic advantages of cooperative development and instill a greater balance between the U.S. and European arms industries.

In 1982, the “Roth-Glenn-Nunn” Amendment charged the leadership of NATO countries “to agree on a strategy and a structure for improving arms cooperation” (17:1-3). Such a strategy and structure could put an end to widespread duplication of effort that wastes financial resources. In addition, the amendment called for a more equitable distribution of both financial burdens and economic benefits of engaging in arms cooperation (17:1-3).

Until the 1980s, IACPs had primarily been conducted by a government-to-government arrangement. Now, however, the emphasis shifted to an industry-to-industry approach. A Defense Science Board (DSB) Study was convened in the early 1980s; its mission was to show *how* arms cooperation could be achieved among cooperating industries (17:2-2). “The DSB stressed the importance of getting cooperation increasingly onto a sound business basis, an indication that economic concerns are never far behind” (55:54). Thus, arms cooperation began to make “good business sense.”

According to the conclusions of the DSB, in order for increased international armaments cooperation to occur, European allies must increase the quality of the technology they are using to develop and produce arms (17:2-3). European NATO countries were currently using second generation technology to produce a wide-array of weapon systems. Thus, although these countries were competitive in the arms market, their technology needed to be leading-edge to be on equal ground with the U.S. “Co-development, as envisaged in the emerging technologies concept, is difficult to implement because it requires a balanced technological sharing and balanced partnerships, and European nations often have not made sufficient investments in R&D” (55:55). As a result of the study, the U.S. was encouraged to think in terms of a “two-way street in technology” as the philosophical underpinning of industrial cooperation (17:2-3).

Because of the high costs associated with new complex weapons systems, an increasing emphasis on arms collaboration appeared to be inevitable. To achieve maximum economies of scale, even the U.S. was actively pursuing opportunities for arms cooperation. Defense budgets were tight in all allied nations, not just in Europe, and therefore, foreign policies focused more than ever on optimizing collective investments in the arms industry. “Effective utilization of aggregate resources has now become a matter of urgency for the U.S.” (19:2). In November 1985, the U.S. Congress established the NATO Cooperative R&D Program. The program’s overall objective was to improve the cooperative R&D and production efforts among NATO countries. Cooperative projects were encouraged by this legislation, primarily in the areas of modification of existing

military equipment, or developing systems that meet common U.S. and foreign military goals (19:3). Examples of the program's objectives were to capitalize on each others' strengths, exploit economies of scale through specialization, encourage cooperation at the "technology base" level, improve financial burden sharing, improve sustainability and logistic support, and provide stability in production levels (19:4). This legislation appeared to establish a plan for a two-way street in technology.

Earlier that year, a study on "The Enhancement of Armaments Cooperation between the Allies" revealed critical deficiencies that needed to be remedied. IACPs were identified as a remedy for these deficiencies (17:2-7). To address this issue, the Secretary of Defense published a memorandum which called for the Services to take the following steps toward increasing NATO armaments cooperation:

- ◆ First, seek out and use every opportunity to inform the Congress of the unequivocal military importance of common and integrated military equipment within the alliance;
- ◆ Second, ensure that existing and new acquisitions programs for armaments to be used by NATO meet the criteria of the following four objectives as cited in the basic letter: 1) Deployment and support of common—or at least interoperable equipment with allies; 2) Incentives for the allies to make greater investment in modern conventional military equipment; 3) Economies of scale afforded by coordinated research, development, production and logistic support programs; 4) DoD access to, use of, and protection of the best technology developed by our allies, and comparable allied access to, use of, and protection of the best U.S. technology, thereby avoiding the unnecessary duplication of developments;
- ◆ Third, ensure adequate protection for shared technology in cooperative research, development, and production, and acquisition of defense-related equipment;
- ◆ Fourth, in establishing operational and design requirements for future major weapons systems, the Services will consult with their European counterparts. Cooperative joint research, development, production, and acquisition

programs will be thoroughly explored, particularly in cases in such common operational and design requirements can be established; mission effectiveness would be maintained at an acceptable level; technology sharing, on a bilateral basis, would provide near-equal benefits to cooperating nations; economies of scale and/or avoidance of duplicative costs are possible; and standardization and interoperability of NATO forces and equipment would be enhanced;

- ◆ Fifth, the Services should establish and give management attention to non-developmental items programs in order to provide an expeditious means of filling material needs through acquisition of existing equipment from other alliance nations. Competition advocates will consider NATO industry sources and equipment along with those of the North American industrial base before approving acquisition strategies or justifications for other than full and open competition for individual contracts;
- ◆ Sixth, the services should review and revitalize the responsibilities and procedures of DoDD 2010.6, Standardization and Interoperability of Weapons Systems and Equipment within the North Atlantic Treaty Organization;
- ◆ Seventh, each Service should establish an education program for their personnel in order to develop and maintain appreciation for the significance of, and individual role in, furthering of alliance collective security through armaments cooperation. (17:2-7,8)

In addition, two more major legislative milestones advanced the cause of IACPs.

The first one, the “Nunn-Quayle-Roth Amendment” to the Fiscal Year 1986 Defense Authorization Bill, attempted to facilitate cooperative arms projects among NATO countries. Essentially, it eliminated prescribed FMS procedures that are normally required. Under this Amendment, when a NATO ally procures or produces a weapon system under the auspices of cooperation, the ally is exempted from the FMS procedures (55:55). The positive impacts of this Amendment were evident, when, in 1987, the U.S. signed 12 Memoranda of Understanding (MOUs) with allied nations to pursue cooperative projects (55:55). An MOU is an official agreement concluded between the defense ministries of NATO nations which rank below government-level international

treaties. These MOUs are “recognized by all partners as binding even if no legal claim could be based on the rights and obligations laid down in them” (16).

The second amendment was the “Nunn-Roth-Warner” Amendment to the Fiscal Year 1986 Defense Authorization Bill. This legislation created funding for the Office of the Secretary of Defense to be used by the military departments in cooperative program ventures involving research and development efforts which include the application of emerging technology for fielded conventional hardware (23:3.2.3). The amendment authorized \$200 million per year for five years to be used specifically for cooperative research and development programs between the U.S. and its NATO allies (27:196). In addition, it authorized funding for testing and evaluation of foreign weapons systems and equipment under the Foreign Comparative Testing Program (see Glossary of Relevant Terms) (13:438).

By and large the 1980s witnessed a trend toward the internationalization of major defense industries, such as aerospace. Increasing co-production and licensing arrangements, as well as cooperative projects where allied countries collaborate in the design, production, and marketing of defense articles, represent evidence of this trend (55:6). It is not surprising that such practices were on the rise in the U.S. and around the world. As the decade came to a close, defense spending was on the descent, and nations were searching for new ways to cut costs without compromising security. Figure 2 on page 46 shows the U.S. trend in defense spending from 1962 through 1998.

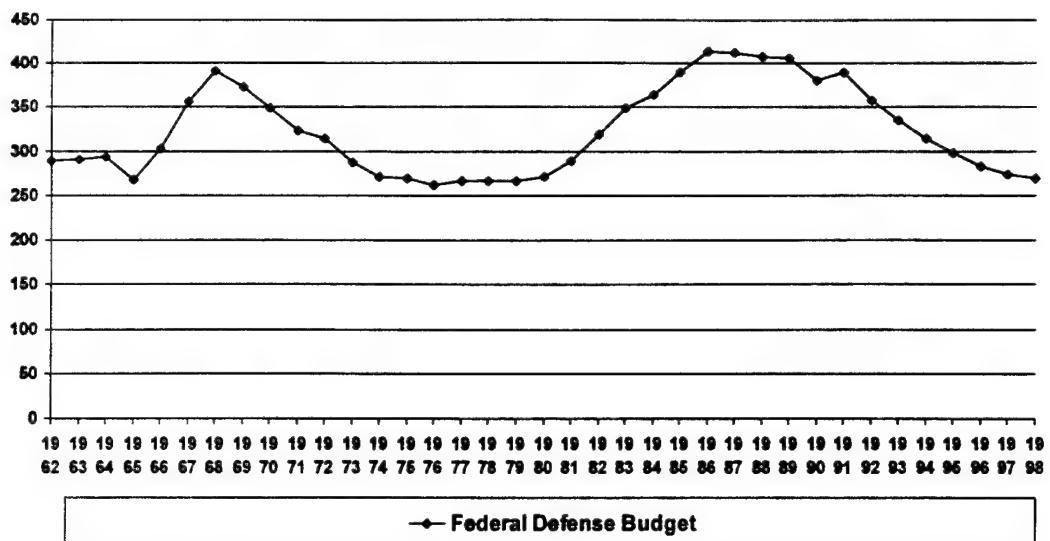


Figure 2. Federal Defense Budget 1962-1998

Data for the years 1962-1996 are presented as historical. The data for 1997-1998 are projected percentages (3:39). (Constant FY 1998 \$ Billions)

<u>Year</u>	<u>Defense Budget</u>	<u>Year</u>	<u>Defense Budget</u>
1962	288.7	1981	288.3
1963	291	1982	319.4
1964	294.2	1983	349.4
1965	268.5	1984	363.9
1966	301.9	1985	389.9
1967	357.3	1986	414
1968	391.5	1987	412.3
1969	373.3	1988	407.8
1970	349.8	1989	406.6
1971	323.2	1990	380.9
1972	314.3	1991	389.4
1973	287.8	1992	357.5
1974	271.4	1993	335.4
1975	270	1994	315.3
1976	261.9	1995	298.1
1977	266.7	1996	282.2
1978	265.9	1997	273.7
1979	266.8	1998	270
1980	270.9		

As illustrated in Figure 2, the U.S. defense budget peaked at \$414 billion in 1986 (also illustrated in Appendix E: Federal Budget Categories as a Percentage of GDP). Subsequent years reflect a sharp decline in defense spending; it is this trend that drives the U.S. and its allies toward a global platform for R&D, and the production, marketing, and sale of defense equipment.

The 1990s and the End of the Cold War

For a half century following World War II, the U.S. and its European allies spent a great deal of time and money preparing for a possible war with the Soviet Union (37:105). This focus shaped U.S. and European NATO countries' foreign policy, drove defense budgets, spawned new technologies, and reinvigorated the defense industrial capabilities of Europe. In the final decade of the twentieth century, this focus has suddenly changed. With the whole world watching, the colossal Soviet Empire fragmented and fell -- putting an end to the Cold War and, at least for now, removing the imminent threat of communist expansion.

In the present decade, U.S. policy makers have been busy identifying new threats and shaping defense objectives to be consistent with them. What are these threats? Unlike in the past, where one aggressive empire succeeded another, the Soviet Union fell quietly with no one to assume the opposing superpower position. As one author described it, "There is apparently no aspirant to forceful global domination waiting in the wings, no aggrieved nation-state with sufficient power to threaten the balance at a global level" (15:39). While there may be no single power poised to dominate the globe, there are still requirements for a superior U.S. defense capability. Indeed, the absence of the

former primary national security concern has not meant an absence of international security challenges. In fact, today, the U.S. faces more diverse and complex challenges than it has in the past. In a 1995 speech to students, one defense leader described the situation in these terms, “I would sum all this up in statistical terms by saying that the mean value of our single greatest threat is considerably reduced. But the irony of the situation is that the variance of the collective threat that we deal with, plan for, and counter, is up” (42:1).

According to the Office of Science and Technology Policy, these complex and diverse challenges consist of rising civil unrest around the world; the proliferation of advanced weapons by rogue nations to include weapons of mass destruction; and finally, environmental and resource degradation due to demographic pressures (1:1). Meeting the challenges of such threats will require “an enduring commitment to diplomatic engagement, military readiness, and economic performance” (1:1). Although these strategies are quite broad in their approach, there are more specific strategies being targeted to meet defense objectives; one such strategy is international armaments cooperation.

Arms cooperation has gained increasing acceptance from the U.S. defense community over the past few years. Although, unlike Europe, the U.S. does not incorporate armaments cooperation into its defense strategy, international armaments cooperation programs are quickly becoming a preferred method of developing and acquiring weapons systems in an era of reduced defense spending. In 1993, then Secretary of Defense, William Perry, established the Armaments Cooperation Steering

Committee (ACSC). The organization's mission was to "lead a renaissance in armaments cooperation" and would be responsible for oversight of the DoD's armaments cooperation activities. These specific activities included ensuring its priority status among DoD operations; compliance with the U.S. national security policy; and coherence in all phases of cooperation, from R&D to production, procurement, licensing, and sales (36:2-1-2-2). This bold step in arms cooperation appeared to favor the possibility of increasing IACPs in the future.

The grounds for cooperation became more fertile for the U.S. as the Secretary of Defense pushed international armaments policy to the forefront of U.S. defense acquisition efforts. This new approach toward armaments cooperation is apparent in the speeches of Dr. Paul G. Kaminski, former Undersecretary of Defense for Acquisition and Technology (USD for A&T). In a January 1995 speech to students attending the Industrial College for the Armed Forces, Dr. Kaminski noted that U.S. allies will be important partners in mitigating regional conflicts (41:1). Many of the regional conflicts that will continue to plague nations all around the world will require some form of intervention. In the past the U.S. was often the only force to intervene in such conflicts. Now, however, it is widely believed that the U.S. will no longer be the only force to interrupt such conflicts.

One month later, Dr. Kaminski spoke at the Center for Strategic and International Studies Inaugural Conference in Washington. His talk focused on U.S. arms cooperation with allies. He referred to an increasing reliance on cooperation to meet U.S. and allied security requirements, as a "renaissance in cooperation." He mentioned the mutual

interest in exploiting cooperative partnerships, and further emphasized three reasons that he believed the United States seeks armaments cooperation opportunities:

- The first reason is political: These programs help strengthen the connective tissue--the military and industrial relationships--that bind our nations in a strong security relationship;
- The second reason is military: There is an increased likelihood of operation in a coalition environment where we need to deploy forces with interoperable equipment and rationalized logistics;
- And the third is economic: Our defense budgets and those of our allies are shrinking. What we cannot afford individually may be affordable with a common effort. (42:2)

The remaining points of Dr. Kaminski's message are significant, insofar as they admit to a poor history of international cooperation, yet re-dedicate the U.S. to building a more accepting environment for arms cooperation in the future. The message targets some of the failed or unfinished cooperative projects, such as Mark XV IFF (Identification Friend or Foe) air-to-air identification system, and the ASRAAM (Advanced Short-Range Air-to-Air Missile) (42:3). In addition, Dr. Kaminski addresses the obstacles of cooperation, namely the "not-invented-here" syndrome; differing national requirements; perceptions that U.S. is the lead, where Europe plays only a sub-contractor role; political divisions; who gets the jobs; and technology release problems. Finally, he touches upon the challenging and complex reality of international armaments cooperation, but completes his talk on a note of hope and vision for successful cooperation in the future (42:3).

Although such visions of hope abounded in the keynote addresses of U.S. defense leaders, progress was slow. For this reason, in 1996, the Office of the Undersecretary of

Defense for Acquisition and Technology requested that a Defense Science Board Task Force convene to investigate international armaments cooperation issues. The cover letter which accompanied the August 1996 report was from the Chairman of the Defense Science Board, Mr. Craig Fields, to the Undersecretary of Defense for Acquisition and Technology. In the body of the letter, Mr. Fields wrote, "We believe that the recommendations of this Task Force are an important change in the way we go about doing international cooperative efforts and, if implemented, would significantly raise the probability of success on future selected programs -- as well as increase the number of such efforts" (14:cover letter). In the introduction of the report, the Defense Science Board Task Force describes the significance of cooperation using the following words:

As defense budgets around the world continue to shrink, nations are faced with the difficulty of maintaining a viable defense industrial capability without eliminating the presence of continuous competition and its concomitant advantages in both cost and performance. As a result, international armaments cooperation is increasingly being considered as a means for achieving coalition and broad security objectives in the post-Cold War era. (14:1)

After listing the benefits of armaments cooperation (reduced R&D costs, access to foreign technologies, interoperability, etc.) the task force reports that the U.S. has thus far shown very limited interest in cooperative endeavors (14:1). In a publication by the Aerospace Research Center in Washington, DC, one particular article suggests that the reason for only intermittent participation by the U.S. in arms collaboration projects is because the U.S. does not view cooperation as instrumental to building an effective defense capability. Further, the article charges that "lack of emphasis on defense trade, poor coordination of cooperative efforts, little support among the military services, and

weak political support have worked against the success of international defense cooperative programs" (56:9).

There is little doubt that the increasingly competitive global arms market is causing the U.S. to re-evaluate its defense strategy. More recently, the added pressure of a shrinking defense budget is yet another force behind recent U.S. initiatives to streamline defense spending, such as acquisition reform and the Revolution in Business Affairs. Indeed, the U.S. is not dealing with yesterday's world order or defense budget, where a single ideological enemy directed foreign policies, and where opposing its threat consumed nearly one-third of the national budget (21:iii).

One of the leading indicators that "business as usual" for the DoD is vastly different from the Cold War days is the huge discrepancy in procurement spending between the two eras. In Fiscal Year (FY) 1985, \$96.8 billion was budgeted for procurement, a figure, which in today's dollars equals \$135.7 billion. In FY 1996, the total procurement budget received only \$39.4 billion--a 71% decrease! (12:5). The 1997 Quadrennial Defense Review (QDR) refers to DoD budget plans as being "fiscally responsible....built on the premise that, barring a major crisis, national defense spending is likely to remain relatively constant in the future" (21:V). This review also noted that while the pressure to balance the federal budget did not drive the defense strategy adopted for the foreseeable future, "it did affect our choices for its implementation and focused our attention on the need to reform our organization and methods of conducting business" (21:V).

One such choice is the result of a "Revolution in Business Affairs." The QDR describes this revolution as an effort to reengineer the Department's infrastructure and business practices in order to afford an effective modernization program, as well as invest in its future. Revolutionary efforts include a long list of better business practices, everything from reducing overhead to streamlining infrastructure. Sources claim that these changes are essential to meeting defense strategy objectives. For example, a review panel, conducted on the QDR, concluded that "The U.S. effort to build a superb force ready to move into the 21st Century is being held back by a Cold War infrastructure" (62:4). Last on the list of better business practices was increasing cooperative development programs with allies (21:15). Cooperation is finally a part of the DoD's defense strategy. Not only is this historically significant, but it also has future significance, as it encourages increased armaments cooperation between the U.S. and its NATO allies.

On 28 March 1997, a few months before the QDR was published, Secretary of Defense Cohen signed a powerful policy memorandum on DoD International Armaments Cooperation. The memorandum directed that international armaments cooperation be used to the maximum extent feasible, and suggested as a minimum that a greater emphasis be placed on "deployment and support of standardized, or at least interoperable, equipment with our potential coalition partners...." and "leverage of U.S. resources through cost sharing and economies of scale..." (11:1) (see Appendix G to review the letter in its entirety). Secretary Cohen also laid out policy guidelines for funding, training, and R&D efforts in the memorandum. It named the Undersecretary of Defense

for Acquisition and Technology as the office of primary responsibility for all international armaments cooperative actions and issues, and directed its coordination with any affected DoD components (see Appendix C for USD(A&T) Organizational Chart and Appendix D for an illustration of key international armaments cooperation positions). In addition, this office was instructed to identify opportunities for cooperation. The policy was effective immediately (11:2).

International armaments cooperation is receiving unprecedented support from senior DoD leaders. It is being incorporated into the fundamental building blocks of U.S. defense strategies, and is mandating full cooperation and support from DoD offices. Steering committees, handbooks, and policy letters have been created to facilitate, guide, and direct U.S. cooperation efforts. The forecast for international armaments cooperation looks favorable, yet obstacles to its future success still remain (32:8-9).

Europe has been participating in cooperative projects for quite some time now, and has recently begun to express concerns about the incompatibility of cooperation and competition. Competition is considered, by both the U.S. and now by Europe, as the “best means for achieving value for money when buying new equipment” (4:4). But many Europeans complain that government intervention in procurement practices hinder a nation’s ability for achieving that “best value”. In Europe, for example, competition is reportedly impaired because of the government policies, which ensure a fair economic and technical return on each partner’s contribution to collaboration, and give countries with less developed defense industrial capabilities work that they would not win in open market conditions (4:5). The U.S. has experienced this on a global level with the “Buy

American Act," but has recently taken steps to remedy this situation with the McCain Amendment to the 1997 Defense Authorization Act. The amendment allowed the DoD to relax some "Buy American" provisions for those countries which have opened their markets to US companies. This measure fosters free and open competition among participating nations, a condition which is even more significant when global defense budgets are shrinking (34:3).

U.S. defense industries have already seen this competitive phenomenon, as mergers and acquisitions continue to consolidate workloads and eliminate excess capacity (22:2). Greater rationalization among governments does affect defense industries. One European source describes what happens in the defense industry when rationalization occurs as follows: "employment in defense industries would fall, only the fittest firms would survive....unhealthily large firms might emerge....co-operation between public and private sector companies would be difficult to organize fairly...international relations might be strained....by definition competition does not please everybody" (4:79). The U.S. has seen unprecedented mergers and acquisitions in the 1990s (see Appendix F), but according to one report, "they have little effect on competition for defense contracts" (22:6).

Competition and cooperation can coexist. It may force industries and governments to find more efficient methods of cooperation, but this can only be seen as a victory both politically and economically. In a recent speech entitled "International Armaments Cooperation for the New Millennium," Mr. Paul J. Hooper, Deputy Undersecretary of Defense, International and Commercial Programs, admits that "true

cooperation is a complex and challenging business" (34). With NATO on the verge of expansion (67:8) and defense procurement down 71%, there appears to be an even greater urgency to team up with allies and exploit the benefits of armaments cooperation.

What began as a political gesture to assist our European allies in rebuilding their defense industries has matured to an alliance of mutual economic and political interests. The world is different now, and it will continue to change, and "when no one nation possesses all the best technologies, when no one nation has unlimited resources, and when nations will be coalition partners, the case for international armaments cooperation is compelling" (34:3).

Chapter Summary

Understanding the history of international armaments cooperation is an important undertaking when trying to get a grasp of current cooperative activities. This literature review charted the course of events that helped shape present-day policies and practices. Each section of the review reflected the status of arms cooperation during that particular time-frame. Collectively, these sections depicted the progress of armaments cooperation from the post-World War II era up to the present. Through historical accounts of cooperative endeavors, including why they were organized and how they were planned, one can comprehend the nature of cooperative development and gain greater insight into what the U.S. could potentially profit or lose from such a relationship. The graphs and tables were intended to give the reader examples of cooperative undertakings among allied countries, to compare import expenditures between the U.S. and NATO European countries, and to reinforce the realities of fluctuating defense budgets. Finally, recent

speeches and policy memoranda and the DoD's new defense strategy all identify international armaments cooperation as an intelligent way for the U.S. to do business in the future.

IV. Research Findings

Chapter Overview

This chapter presents the information obtained during the research interview process. Research findings appear in the form of responses to questions and current and future models of international armaments cooperation. Together these findings represent the progress of cooperation, and more importantly, they indicate the degree of its utility in the future.

In Chapter II, a description of the interview protocol was given (see Appendix H). All of the research questions contained in the interview protocol, along with their responses, represent the first section of this chapter, Interview Results. These results were written to reflect, as accurately as possible without direct quotation, the answers provided by the senior DoD officials that were interviewed (see Appendix A for a listing of interviewees). In addition to addressing the interview research questions, this chapter offers three models that reflect how present and future DoD acquisition efforts might be accomplished. Each of the three models is defined in terms of its relevance to international cooperation. Where clarification or supporting data are required, references have been made to additional sources, such as Congressional Budget Office (CBO) studies and statements made before Congress by senior DoD leaders. Finally, all of the research related to the interview process was studied and organized to draw conclusions about the future of international armaments cooperation.

Interview Results

Interviews were conducted with senior DoD officials and international program managers in Washington, D.C. and at Wright-Patterson Air Force Base, Dayton, Ohio. The overall objective of conducting personal interviews was to gain insight into the possibilities of international armaments programs playing a key role in the acquisition of weapon systems in the future.

All personnel interviewed were given the same set of interview research questions. In order to keep the responses focused and succinct, the interview tapes were reviewed to extract only the most critical data that applied to each individual question. Instead of listing each interviewee's response to a question, the responses were grouped together according to the question they answered. Then, they were carefully combined to reflect a collective response.

Interview Question No. 1: To what degree should an international cooperative partner be involved in an ACAT1 weapon system acquisition? Consider their political, technological and economic roles (see Glossary of Relevant Terms for an explanation of ACAT1 Weapon System).

The degree of involvement should be directly proportional to their level of resource infusion (26). To measure this, it is essential to come up with a mathematical formula to cost out each phase of the program as if the U.S. were doing it alone. This way, you can use the partnering nation's resource contribution as a percentage of input to calculate the level of work share for that country. This works better in the tail end of the program because in the early stages of development it is difficult to place a monetary value on qualitative areas such as the initial requirements generation process. The Joint

Strike Fighter (JSF) Program is a good example of this (59). JSF program managers agreed upon a fee up front. The amount of money contributed by a partner up front determined their level of participation in the program.

1a. What type of political agreement would help to foster an equitable relationship between the US and a potential international cooperative partner in an ACAT1 acquisition effort?

It is difficult to determine each nation's definition of "equitable" (35). The partnership should first begin by developing a fact-based political consensus on the National Armaments Director (NAD) level (64). For example, in the U.S. this position is held by the Under Secretary of Defense for Acquisition and Technology. Partner nations should appoint NADs with the same degree of influence. If consensus is achieved on this level, it means that the people involved in making a decision to form a partnership in the first place represent top leaders from each participating country. There are several potential cooperative partners out there; one problem that should be addressed is that many have their own agenda, which ultimately meets their own unique needs, and may not necessarily reflect the needs of the partnership (54). Some countries will enter into a cooperative effort for jobs created in the work share process and not necessarily for the technology. Others want to drive the program to a point technologically that may not make the system as effective as it could be. Requirements commonality is a good goal; however, there will always be a "my technology, my requirements" type of attitude that must be overcome at the NAD level. If the U.S. were to agree on all partners' individual needs, whether too flexible or too specific, the program may not succeed (54). Once the program is past the initial requirements identification, which is perhaps the most difficult

part, the cooperative program is well on its way. So, there must be a political consensus up front that establishes what the partners want the program to do.

1b. What are the economic advantages/disadvantages of developing an ACAT1 weapon system as an international cooperative program?

A common view of supporters of international cooperative programs suggests that it costs more and it takes longer up-front to do an international cooperative program (26). Each partnering nation realizes the benefit of a cooperative program at the tail end. Most of the savings that will be recognized by developing a major weapon system cooperatively comes in Milestone I and Milestone II (64) (see Appendix I: U.S. DoD Systems Acquisition Model). The general consensus of the interviewees was that a cooperative program will cost approximately 120% of what the U.S. could build the same system for. However, while the overall costs of a cooperative program may be higher, the shared costs for each participating country is lower (71).

The economic disadvantage was generally cited as the unequal capability of the partners to contribute financially and/or technologically to the program. As defense budgets around the globe continue to decline, there may be an even greater concern of unequal contributions. Levels of burden sharing in terms of R&D expenses during the Concept Exploration phase of the program need to be established in the initial stages of the program. For this reason, the U.S. should ensure that cooperative efforts address mission needs or operational requirements that are shared by allies (64).

1c. How does the rapid change of technology impact the role of an international cooperative partner in an ACAT1 major weapon system acquisition?

The responses to this question were primarily in terms of “releaseability”. There were opposing views addressing whether or not the releaseability of technology, including software, was a viable concern in the post-Cold War era. Those that considered releaseability issues as a factor in future armaments cooperation voiced concerns of third party transfers, while others viewed technology releaseability as an opportunity to allow partnering countries access to technologies that they might later advance in other systems that might be of value to the U.S.

Another issue of releaseability was current U.S. disclosure policies. One interviewee suggested that in the post-Cold War era, realigning the disclosure community to put it in step with the political decisions made at the SECDEF level or higher would allow future international armaments cooperation efforts to more easily fit into the security strategy identified by the Chairman of the Joint Chiefs (CJCS) (26). (The interviewee asked that this statement be clarified to express his belief in having a strong need for the reviews conducted by the disclosure community but that current disclosure policies do not reflect 1997 U.S. international cooperative political and military strategies). In addition, other interviewees said that what the U.S. decides it is going to share and not share must be analyzed in terms of risk assessment and not necessarily risk avoidance (33;64;71). As a final note, one interviewee who asked not to be quoted said, “It is embarrassing [for the U.S.] to make an international agreement and then to have it blocked by policy and procedures that have not kept pace with the acquisition reform and international involvement policies.”

Interview Question No. 2: What are the primary operational, logistical, and security considerations/concerns of developing an ACAT1 major weapon system as an international cooperative program?

Responses to Question No. 2 were limited to addressing the operational and logistical considerations of International Cooperative programs. Most interviewees felt that the security considerations were adequately addressed in Question No. 1c. above.

Operational considerations, as much of the current literature on armaments cooperation suggest, are a concern for the interoperability of coalition forces. As Secretary of Defense Cohen stated in his March 28, 1997 policy memorandum, "We (the U.S.) must achieve as a minimum..... deployment and support of standardized, or at least interoperable, equipment with our potential coalition partners..." (11) (see Appendix G). Many interviewees stated that as the U.S. military changes its strategy to include a stronger use of coalition forces in future warfare scenarios, the DoD acquisition community must also change its strategy toward armaments cooperation as a response to ensuring the interoperability of U.S. forces with its allies (33;35;71).

Comments on the logistical considerations of an International Cooperative Program centered around supportability and maintainability of new weapon systems, and the ability of U.S. depots to meet war-time readiness requirements for spare parts. The issue of depots is discussed in Question No. 2b. below. Of particular importance was the use of limited Contractor Logistics Support (CLS). The use of CLS was discussed by several interviewees in terms of the current "Revolution in Business Affairs" as outlined in the May 1997, Report of the Quadrennial Defense Review (QDR) (21:15). As the U.S. DoD continues its efforts to reduce defense spending, the outsourcing of "support

activities", including some of the current organic maintenance capabilities, concerns some leaders who believe that the DoD should retain the organic capability to fully support U.S. weapon systems in a war scenario (75). In addition, they would like to see the U.S. ensure its ability to establish organic maintenance capability for systems developed as international cooperative programs (75).

2a. How important will it be for US military personnel to be able to maximize international operational interface in future warfare scenarios?

This question was answered unanimously by all interviewees. The general consensus was that the ability of U.S. forces' systems to have a high degree of operational interface with existing and future allied defense systems is essential to the effective implementation of U.S. military strategies. The use of International Cooperative Programs to develop future defense systems, especially those systems developed with countries that are expected to become members of coalition forces, is important. It is significant not only in terms of the interoperability and commonality of the systems, but also in terms of minimizing the logistics footprint necessary to support these coalition forces in a forward areas.

2b. What impact will the development of international cooperative ACAT1 major weapon systems have on Integrated Weapon System management (IWSM), US depots, and Contractor Logistics Support (CLS)?

IWSM may be more difficult to track because the span of direct U.S control during the acquisition process is significantly minimized when the program is directed through an international steering committee. In addition, many interviewees expressed concern over the ability of the programs managers to communicate with regard to issues,

ranging from planning to follow-on support of a weapon system. Thus, supporters of international armaments cooperation at the senior DoD level questioned the U.S.'s ability to effectively implement the "cradle-to-grave" philosophy of IWSM for a large-scale cooperative project, such as a major weapon system acquisition effort (2).

When it comes to the issue of depots in an international armaments partnership, there are two primary things to consider. First, the long-term impact that privatization of U.S. depots may have on a cooperative program is still under consideration. Second, U.S. government officials have a responsibility to the American taxpayer. Most Americans want their tax dollars spent in the U.S. -- which is the same desire that all cooperative partners have with regard to their own domestic situations. U.S. taxpayers do not want to see their tax dollars go to overseas companies when U.S. depots are underutilized and are being considered for closure (35).

See Question No. 2 for a discussion on international armaments cooperation and CLS.

2c. Can current U.S. technology insertion, interface, and transfer policies provide for adequate security of advanced software system configurations in an international cooperative program?

With regard to U.S. technology's ability to adequately protect software, the majority of interviewees answered positively. Most agreed, however, that the U.S. needs to develop a new policy for how it handles software security. One interviewee suggested that the U.S. should write this policy in such a way that it is not the *functions* of the software that are protected, but rather the *information* that is put into the system (26). Thus, it is the information that allows the technology to work, and not the software. The

information becomes the critical technology, not the software. In an era when many countries have the capability to use reverse engineering, the protection of source code should not be nearly as important as protecting the information that makes the weapon system function effectively (54).

Interview Question No. 3: What program management requirements must be addressed in order for the U.S. to use the Joint Strike Fighter program as the model baseline for all international cooperative ACAT1 weapon systems?

Most interviewees found this question difficult to answer in specific terms. Many of the responses included controlling the requirements baseline and follow-on configuration of the system as it develops. However, most interviewees consider the program's use of cost-as-an-independent-variable (CAIV) and its ability to implement acquisition reform policies as model practices for other international cooperative efforts.

3a. Are the program management policies currently being used for the Joint Strike Fighter Program sufficient to be used as a baseline for an international cooperative ACAT1 program in the future?

According to one source, the JSF program, through the use of cost-as-an-independent-variable, early requirements generation, commonality of systems, and levels of international involvement, is setting a new standard for international cooperative programs (59).

Another respondent, who preferred not to be quoted, disagreed. While this interviewee did admire the success of the JSF so far, he identified the Medium Extended Air Defense System (MEADS) (see next section, Models of International Cooperation, for details on the MEADS Program) as a better model for early international armaments

cooperation. His reasoning was that the MEADS program has been a true international cooperative effort from the beginning, where the JSF began as a U.S. acquisition effort among American service branches, and later expanded into the international arena.

3b. What challenges could be expected from having an international cooperative partner be the Program Director for an international cooperative ACAT1 weapon system that the U.S. is highly involved in program?

Interviewees overwhelmingly pointed to one program management challenge that could appear in a major weapon system acquisition where the program director is not from the U.S. This challenge is the ability to create an organization that adequately supports U.S.-specific requirements. Other challenges mentioned include the director's ability to support an international Integrated Product Team structure, to integrate budgetary cycles of different nations, and to overcome communication barriers, such as computer language compatibility. On the other hand, one interviewee gave an real-life example of this very situation: the MEADS program, managed in Huntsville, Alabama, has a German Program Director overseeing the project. So far, he says it has worked out very well, with minimal challenges.

3c. What systems acquisition role will the U.S. have in an international cooperative ACAT1 weapon system acquisition if a U.S. based firm is not the prime contractor? (e.g. Lockheed Martin, Boeing-McDonnell Douglas vs. British Aerospace, etc.)

Some interviewees believed that this would never occur; they insisted that the U.S. Congress would not approve considerable funding for a program, where the U.S. did not have direct oversight of primary contractors. Other interviewees disagreed. They referred to current cooperative policies, where transatlantic teams already compete for

defense contracts. The purpose of using transatlantic teams is to allow each country interested in developing a weapon system under international armaments cooperation an opportunity for its contractors to compete in an open market for defense contracts. This practice has a positive impact on the political and economic relationships between the U.S. and its allies (54;71).

Models of International Cooperation

The next section of this chapter addresses the question of using a baseline model to guide the acquisition process of major weapon systems developed as international cooperative programs. During the interview process, the question of using a model to guide future international cooperative development programs came up. Three models were referenced as good examples of cooperative success that may be looked at in the future as baseline models for armaments cooperation guidance: the Defense Science Board Task Force on International Armaments Cooperation: *A Proposed Model for International Cooperation in the 21st Century*; the Medium Extended Air Defense System (MEADS): *A Model of Trans-Atlantic Teaming*; and the Joint Strike Fighter (JSF): *A “Family of Aircraft” Approach to Joint and International Cooperative Development*.

Defense Science Board (DSB) Model. Defense Science Board Task Force on International Armaments Cooperation: *A Proposed Model for International Cooperation in the 21st Century*.

In 1996, the Under Secretary of Defense for Acquisition and Technology requested that a Defense Science Board Task Force convene to research two broad issues.

The first issue was “A description of a generic model of international armaments cooperation for the 21st Century” (14:1). The purpose of this model was to ensure that competition and two-way technology transfer occur in the arms cooperation process. In addition, the model is intended to make full use of the civil industrial base and guarantee the U.S. military’s unobstructed access to crucial military technologies (14:1). The second issue involved management actions that must be taken to make success possible in an arms cooperation endeavor. If adhered to, this model will eliminate past barriers to fortuitous arms cooperation projects and demonstrate the full potential of cooperative partnerships in the development and procurement of advanced weapons systems.

The following eight elements comprise the model recommended by the Defense Science Board Task Force (14:3-5):

Element No.1: Defining a Security Objective. Instead of considering international armaments cooperation as a way to conserve resources, cooperative partners should concentrate on satisfying overall security objectives. The DoD is now being encouraged to issue “an unambiguous statement of geopolitical and military focus” (14:3), which will reinforce the objective of coalition capability and force the senior leaders of the partnering organizations to prioritize the needs of the coalition.

Element No. 2: Selection of Common Mission Problems. The focus of international cooperation should not be limited to arms programs. Instead, international cooperation should embody a multitude of programs, which furthers coalition security. Examples of such programs are multi-lateral interoperability of communications, friend-or-foe or neutral identification systems, and coordinated logistics. All of these programs should represent common needs rather than reflect the needs of one or two partners.

Element No. 3: Requirements Generation. Cooperative partners must focus on common-interest features of a weapons system. The performance capability requirements of a weapons system should be decided and agreed upon by all partners. Affordability and interoperability should be important factors for all partners.

Element No. 4: Satisfying Industrial and Economic Objectives. Duplication and over-capacity should not occur among partners. These are wasteful practices which, in turn, cause political frustration. Cooperative partners should strive to fulfill industrial economic objectives. To do this, the Task Force claims that “nations must view and conduct program selection, the establishment of program goals, and program structuring in the same manner as future war-fighting and crisis operations-from the viewpoint of an actual alliance” (14:4).

Element No. 5: Required Industrial Structure. Competition should be a central component of the industrial structure. The Task Force suggests using “world class teams comprised of transatlantic primes and subcontractors” (14:4) to compete for the opportunity to resolve cooperative problems. The Task Force also encourages the use of commercial and dual-use technologies to avoid duplication and save resources. Nation-specific defense capabilities requirements can be addressed, but only outside the program itself.

Element No. 6: Maintenance of Competitive Market Forces. Competition should maintain a presence throughout the life of the program. To do this, “alternative strategic competitors should be identified and made visible within the program, and no other ‘national solutions’ should be pursued in parallel” (14:4).

Element No. 7: Defining the Government’s Role. The government will no longer determine the industrial structure of a cooperative program. From now on, the government will establish business rules up front that address sensitive issues, such as “technology transfer controls, third country sales, penalties for withdrawal, and dollar levels of work share” (14:4). The structure of industry will be left up to the discretion of transatlantic industry teams. These teams will own the decision-making power for determining the types of work that are assigned to a particular company, and in which country will that work be accomplished. This way, the industrial structure is determined by market forces, not by government policy.

Element No. 8: Execution of Programs. This element prescribes changes in policy, procedures, and organization, in an effort to minimize barriers that have hindered the successful execution of programs in the past. Policy changes include establishing a policy framework and by working together with international partners, the policy will evolve as appropriate. Procedural changes include 1) incorporating the top leaders across the full spectrum of partner organizations; 2) hastening the acquisition reform process; 3) creating an incentive program for all involved parties, both on an organizational level and on an individual level. Finally, organizational changes call for the consolidation of international implementation activities into one organization to include the OSD international programs office, the Defense Technology Security Administration, and the

Defense Security Assistance Administration. In addition, a new position should be created at the assistance secretary level to oversee the management of all of these activities. Lastly, it is important that any program manager who is assigned to lead a cooperative program has had international or joint experience before undertaking a cooperative program manager position.

The DSB model discussed above holds many promises for international armaments cooperation, provided it is fully understood and implemented by the U.S. and its cooperative partners. Future weapons systems developed within international cooperative partnerships will no doubt rival many of their celebrated predecessors if the DSB model is used to guide the arms cooperation process. The next two models that follow in this discussion, the MEADS and JSF programs, are examples of cooperative successes because they incorporate many of the elements featured above.

The Medium Extended Air Defense System (MEADS): A Model of Trans-Atlantic Teaming.

The MEADS is a mobile surface-to-air missile system that is capable of providing 360 degrees of defense protection for troops and other assets against short-range ballistic missiles and cruise missiles (45:4). One of the most attractive characteristics of the MEADS from a coalition standpoint is its high degree of interoperability. In a battle zone, this characteristic means an enhanced allied defense capability (58:2).

MEADS is a cooperative partnership between the U.S., Germany, and Italy (France was initially involved in the project but withdrew because of a lack of funds) with a cost share of 60, 25, and 15 percent respectively for the program definition and validation phase (24). This partnership utilizes the concept of trans-Atlantic teaming.

Trans-Atlantic teaming is an international arrangement of teams, primary contractors and sub-contractors that allows competition on an international level. The purpose of employing trans-Atlantic teaming arrangements is to ensure the benefits of international competition are present in the procurement effort, while at the same time maintaining strong political and military ties with European allies (71).

At a 1996 conference, former Under Secretary of Defense for Acquisition and Technology, Dr. Paul Kaminski, said "the theater missile defense area offers an excellent example of the renaissance in trans-Atlantic armaments cooperation" (43:5;44:5). The MEADS program stands out in this post-Cold War environment as an example of how the OUSD (A&T) would like to see future armaments cooperation initiatives developed. The reason that MEADS is such a good model is because it exemplifies how to maintain a "win-win" opportunity for the competitive industrial bases of the U.S. and its allies. There are two trans-Atlantic teams for the MEADS program which are scheduled to complete the Program Definition phase in late 1998, one lead by a combined Hughes and Raytheon venture, and the other lead by Lockheed Martin (see Appendix I for an illustration of the DoD Systems Acquisition Model). Each team has a 50-50 arrangement with the European consortium named Euromeads. This European consortium is comprised of a group of well known defense companies in Europe, including Alenia Aerospazio, Daimler-Benz's LFK subsidiary, and Siemens. All members of the European consortium have equal shares in the overall development of the project. At the end of the Program Definition Phase, one of the teams will be selected to take the program into the design and development phase (60:53).

The Joint Strike Fighter (JSF): A “Family of Aircraft” Approach to Joint and International Cooperative Development

From its inception, the Joint Strike Fighter program was structured to be a flagship for acquisition reform (66). In addition, the JSF program has been recognized as a potential model for international cooperative development programs. Unlike its predecessors, the JSF program has involved international partners in the early stages of the operational requirements identification process. The program uses the “common family of aircraft” approach to procurement. This is because it has a high degree of commonality among aircraft variants, which serves to satisfy the strike warfare requirements of the Navy, Air Force, Marine Corps, and international partners.

One of the most significant features of the JSF is that it uses “cost as an independent variable (CAIV)” (49). Put simply, this means that in the JSF program, cost is considered to be on an equal playing field with schedule and performance criteria. In the JSF program, affordability is achieved through “cost-performance trades, and lowering (program) risk by investing in and demonstrating key leveraging technologies and operational concepts prior to the start of engineering, manufacturing, and development” (47). For these reasons, the JSF is breaking new ground -- not only in what types of weapon systems the DoD purchases, but also in how these weapon systems are purchased (46).

According to the January 1997 Congressional Budget Office (CBO) Study, entitled, *A Look at Tomorrow’s Tactical Air Forces*, the Joint Strike Fighter is a multi-role strike fighter aircraft expected to replace the Air Force’s multi-purpose F-16 and A-

10, the Navy's long-range A-6 attack plane, and possibly its F-14 fighter, and the Marine Corps' AV-8B jumpjet (70:xiii). In the international arms market, the Short Take-Off and Vertical Landing (STOVL) version of the JSF is currently expected to replace the United Kingdom Royal Navy's Sea Harrier aircraft (47). British firms involved in this endeavor include Dowty Aerospace, Meesier-Dowty, Martin Baker, and Lucas Aerospace (30:16).

The JSF's common "family of aircraft" approach is a new way for the DoD to do business. The JSF program is building three different airplane designs with several key components in common, including engines, avionics, and structural components (39:2). All three aircraft variants will be produced on the same production lines using flexible manufacturing technology (39:2). Again, the focus of the "family of aircraft" is on affordability-reducing development, production, and ownership costs while meeting the operational requirements as identified in the Joint Initial Requirements Document (JIRD) (47).

Using cost as an independent variable (CAIV), the JSF program moves away from the past practice of allowing the desired performance level of the system to drive the cost and schedule of development. The importance of developing a weapon system with the life-cycle cost of the system in mind is not an entirely new approach. However, according to Dr. Kaminski, the JSF program is the first program to give serious attention to the life-cycle cost of the weapon system early in the program. The projected life-cycle savings using the "family of aircraft" approach and CAIV is projected to be at 33 to 35

percent in comparison with past major weapon system acquisition program processes

(47).

International cooperation in the JSF program is based on four program-unique levels of participation. According to Dr. Kaminski, these four levels allow a participating nation to either influence or watch how the JSF program is developing system requirements (50:55). The levels are described in the following paragraphs:

- 1) The highest level of involvement by U.S. allies cooperating in the JSF program is known as a "Collaborative Development Partner," or full partner. The United Kingdom (UK) signed a Memorandum of Understanding (MOU) in December 1995 and currently is the only nation participating at this level. The UK has committed to contributing \$200 million dollars to the Concept Demonstration Phase. As collaborative partners, the UK and U.S. have equal influence over the development of the STOVL version of the JSF. The objective of the both partners is to harmonize their unique operational requirements in order to field a superior weapon system to replace their aging Harrier fleets. (6)
- 2) An "Associate Partner" in the JSF program again works under an MOU but has only limited participation and involvement in the decision-making process where requirements, technology, or other core processes are concerned. Multi-lateral Memoranda of Agreements (MOA) are currently being negotiated with Denmark, Norway, and The Netherlands. In the future, these countries may enter the JSF program as Associate Partners. This relationship gives these countries the opportunity, depending upon data disclosure access, to harmonize future operational requirements using their threat data in the simulation models of the JSF program. In addition, they have input, but not direct influence, regarding the requirements evolution of the conventional take-off and land version of the JSF (6). Through this exposure, associate partner countries are able to determine if the JSF is a valid replacement for their aging F-16 fleets.
- 3) The third level of involvement in the JSF program is the "Informed Customer". As the name reflects, this level of participation allows the country to be informed or have access to information on the JSF in order to evaluate the weapon system as a possible replacement for their current aircraft. This level does not afford the participant any level of influence in the programs processes. Currently, the U.S. is negotiating agreements with Canada for its entrance into the JSF program at the Informed Customer level. (6)

- 4) The last level of participation allows members of foreign industry to engage U.S. industry in future partnerships by subcontracting with the prime contractors of the US in subsequent phases of the program. Foreign industry firms from Russia, France, and Great Britain are currently involved at this level. (38)

Since its inception, JSF program has received wide recognition for its efforts in implementing acquisition reform initiatives (40):

The DoD David Packard Excellence in Acquisition Award (March 1997)

--"For acquisition excellence and superior performance as DoD's flagship innovative Family of Aircraft program."

The USAF Acquisition Lightning Bolt Award (March 1997)

--"For outstanding contribution and diligence in developing and implementing innovative processes and practices."

The DoD Joint Meritorious Unit Award (April 1996)

--"For progressing at an incredible rate to establish a secure foundation for the successful development and production of next-generation strike weapon systems for the services and allies."

President Clinton's Endorsement (August 1995)

--"This good inter-service cooperation has to be the wave of the future."

"The Joint Strike Fighter program, I think, is a model of the new way ahead that we are pursuing in Department of Defense acquisition programs" (47). The JSF is a highly desirable weapon system, not only because of its superior defense capabilities, but also because it represents a significant advance in acquisition reform and furthers the allied goals of interoperability. The year 2008 has been targeted as the delivery date for the first round of JSF aircraft (29:28).

Summary of Models. The Defense Science Board Model for international armaments cooperation prescribes eight elements for a healthy cooperative program. These elements include satisfying overall security objectives of participating partners by viewing the project from a “common needs” perspective. This eliminates the old tendency of entering a partnership with nation-specific interests. Common interests could be designing and developing weapon systems with interoperable features, or considering affordability of the weapon system into the planning phases. By avoiding duplication and over-capacity, the DSB model claims that cooperative projects will reduce wasted efforts and resources. Finally, competition and leadership involvement are a must to realize cooperative success. The DSB model leaves no stone unturned in its attempt to create a formula for cooperative success. It is clearly evident that these elements are based on fact and experience, and that, if closely followed, will unlock the full potential of international armaments cooperation in the future.

Both the MEADS and the JSF are heralded achievements in international cooperative development in terms of program structure. To date, they are two of the best examples of designing highly interoperable defense systems which could significantly strengthen coalition forces in a war environment. In addition to their interoperable features, the MEADS and JSF programs exemplify considerable strides in acquisition reform.

For the MEADS program, its keen use of trans-Atlantic teams to realize “best-value-for-the-money” practices in a competitive international industrial environment has been lauded by the international armaments cooperation community (24:2;54).

For the JSF, its economic claim to fame is its incorporation of cost-as-an-independent-variable (CAIV) into the program management plan. With the JSF, no longer will the desired performance level of the system drive the cost and schedule of development. Instead, JSF program partners consider cost at the earliest stages of development, enabling them to realize full life-cycle savings from the outset. In addition, its flexible manufacturing technology enables three variations of the aircraft to be produced on the same production lines, satisfying multiple customer requirements. The JSF has also captured the international community's attention as an attractive replacement for F-16 fleets all around the globe. Thus, affordability and flexibility make this fighter aircraft a model of international cooperative success.

V. Conclusions and Recommendations

Conclusions

The Road to Arms Cooperation. A retrospective look at the evolution of international armaments cooperation revealed its progressive climb toward a collaborative association that is mutually beneficial to all cooperative partners. Each era represents incremental successes in a unique relationship that allowed the U.S. and its allies to experience the political, economic, technological, and defense-related advantages of arms cooperation.

In the post-World war II era, arms cooperation was in its infancy. Defense assistance programs represented early forms of cooperation, as the U.S.'s sole objective was to assist Europe in rebuilding its defense industrial capability. Weapon systems development occurred only on a national level in this era, as most countries' ability to produce weapons was diminished due to weakened industrial capabilities.

As communist expansion became an increasing threat to democratic security, the need to oppose this threat strengthened in parallel. The U.S. and several European countries agreed that an allied force would be a more effective deterrent to communism. The North Atlantic Treaty Organization was formed to acknowledge and function as a coalition of democratic partners. The very existence of this coalition advanced the cause of arms cooperation, as an allied force required standardized and interoperable defense systems in order to effectively oppose the enemy. The U.S. increased its assistance to Europe during this period, indicating a stronger commitment to allied partners and laying

the foundation for exploring more intense forms of arms cooperation in the coming decades.

The 1950s, 60s, and 70s witnessed an overall increase in arms cooperation as licensed production of U.S. weapon systems in foreign countries became more and more prevalent. While economic interests often foiled cooperative agendas, arms cooperation programs managed to thrive on smaller levels outside the bounds of rigid NATO requirements. Europe regained its defense industrial strength during this period and emerged as a strong competitor in the defense industry. As European defense exports increased, the U.S. experienced a significant loss in defense market shares abroad. Still, Europe did not have the same economies of scale for the research and development phases of arms production as the U.S., a fact that produced second-rate technology in European weapon systems.

The U.S.'s waning lead in the defense market, coupled with an awareness that the goals of RSI and a strong allied force were far from realized, caused the U.S. to develop and implement policies that fostered greater arms cooperation. The 1980s ushered in a greater trend toward the internationalization of weapon systems among allies and it demonstrated a shift from government-controlled cooperation to a looser form of cooperation that was almost completely subject to competitive market forces.

As the 1980s came to a close, the Cold War reached its conclusion. Defense budgets began to plummet, yet the need for security remained constant. With the foundation for arms cooperation in place, large-scale collaboration efforts made better economic sense. Therefore, the U.S. made attempts to ease international arms

collaboration efforts by simplifying negotiation processes. Sharing high costs associated with researching and developing weapons systems with international cooperative partners became an increasingly attractive option in the early 1990s. While arms collaboration had occurred prior to the 1990s, full scale cooperation was not incorporated into the U.S.'s defense strategy until recently.

Economic factors caused the U.S. and its allies to recently develop handbooks for cooperation and explore models for implementing arms cooperation programs. Significantly reduced procurement budgets eliminated dollars for weapons but not the need for them. In addition, a coalition of forces seem to serve the purposes of present and future defense objectives more effectively than any one conglomerate force. International arms cooperation has been a fluctuating priority of many nations since the end of World War II. Its significance was determined by economic cycles more often than political trends. Remarkably, arms cooperation has weathered these cycles and trends, evolving into a gainful option for continuing an allied tradition of producing the best weapon systems in the world.

The Cooperative Road Ahead. In an era of declining defense budgets, international arms cooperation is a good business practice. Both the U.S. and its NATO allies will enjoy greater economies of scale, minimized risks, access to foreign technologies, and “best-value-for-the-money” products offered by an open and competitive market. However, lessons of the past should be fully understood by all cooperative partners before agreeing to any cooperative project. Defense authorities alike, from all NATO countries, agree that arms cooperation is an effective solution to

weapons development and procurement challenges, but they also recognize that cooperation does not work in every case. It is up to the participating countries to overcome historical barriers to successful arms cooperation by following newer models for such endeavors. Every effort must be made by participating countries to act as an alliance from the early stages of a project through its completion. The objective, therefore, is not to achieve international arms cooperation; rather it is to strengthen a coalition of forces, by pursuing the same goals of RSI set forth by the pioneers of arms cooperation shortly after WWII. By putting nation-specific mission requirements aside and arriving jointly at program goals, cooperative partners will truly learn the benefits of compromise in a finished defense product, which is technologically superior and befitting the defense objectives of an allied force.

Recommendations for Further Research

While this thesis suggests no specific recommendations for action in international arms cooperation, there are several aspects of such partnerships that can be explored in greater detail that may enhance future arms cooperation programs.

Policy. The first area for further research is to study the long-term impacts of Secretary Cohen's policy memorandum on future international armaments cooperation programs. In particular, this research should address the establishment of cooperative policies and funding programs, and address the degree, or rate, that this memorandum served to advance the internationalization of weapon systems.

Supportability Issues. A second area for further research is to analyze the effects that privatizing U.S. military depots has on the supportability of international arms cooperation programs, to include the use of contractor logistics support.

Baseline Models. A final recommendation for further research is to assess the validity of using the MEADS and JSF programs as baseline models for international armaments cooperation. This assessment should occur after the initial fielding of these systems in order to accurately measure their ability to serve as models for continuing international armaments cooperation programs.

Appendix A: Alphabetical Listing of Personal Interviews

Colonel Dave Abati

Director, Armaments Cooperation Division,
Office of the Deputy Under Secretary of the Air Force, International Affairs

Mr. Bruce C. Bade

Director, Armaments Cooperation Pacific,
Office of the Deputy Under Secretary of Defense, International and Commercial
Programs

Brigadier General Robert P. Bongiovi

Vice Commander, Aeronautical Systems Center

Mr. Donald B. Bowers

Senior Analyst, TECHPLAN Corporation

Mr. Robert Bruce

Director, Armaments Cooperation Atlantic,
Office of the Deputy Under Secretary of Defense, International and Commercial
Programs

Colonel Bill Buzzell

Deputy Director International Affairs, Joint Strike Fighter System Program Office

Colonel Mauro Farinelli

Director International Affairs, Air Force Security Assistance Center

Mr. James A. Fowler

Senior Analyst, TECHPLAN Corporation

Lieutenant Colonel Robert N. Gamache

Special Assistant, Office of the Under Secretary of Defense, Acquisition and Technology

Mr. Stan Hicks

Director International Armaments Cooperation, Navy International Programs Office

Mr. Paul J. Hooper

Deputy Under Secretary of Defense, International and Commercial Programs

The Honorable R. Noel Longuemare
Under Secretary of Defense, Acquisition and Technology

The Honorable Arthur L. Money
Assistant Secretary of the Air Force for Acquisition

Lieutenant General George K. Muellner
Principal Deputy Assistant Secretary of the Air Force for Acquisition

Dr. Spiros G. Pallas
Principle Deputy Director for Strategic and Tactical Systems,
Office of the Under Secretary of Defense, Acquisition and Technology

Mr. Henry A. Themak Jr.
Deputy Director, Cooperative Research Development Testing and Evaluation,
International Armaments Cooperation, United States Army

Mr. Alfred G. Volkman
Assistant Deputy Under Secretary of Defense, International and Commercial Programs

Rear Admiral R. D. West
Deputy Program Director, Ballistic Missile Defense Organization

Brigadier General Michael E. Zettler
Director of Maintenance, Office of the Deputy Chief of Staff of the Air Force,
Installations and Logistics

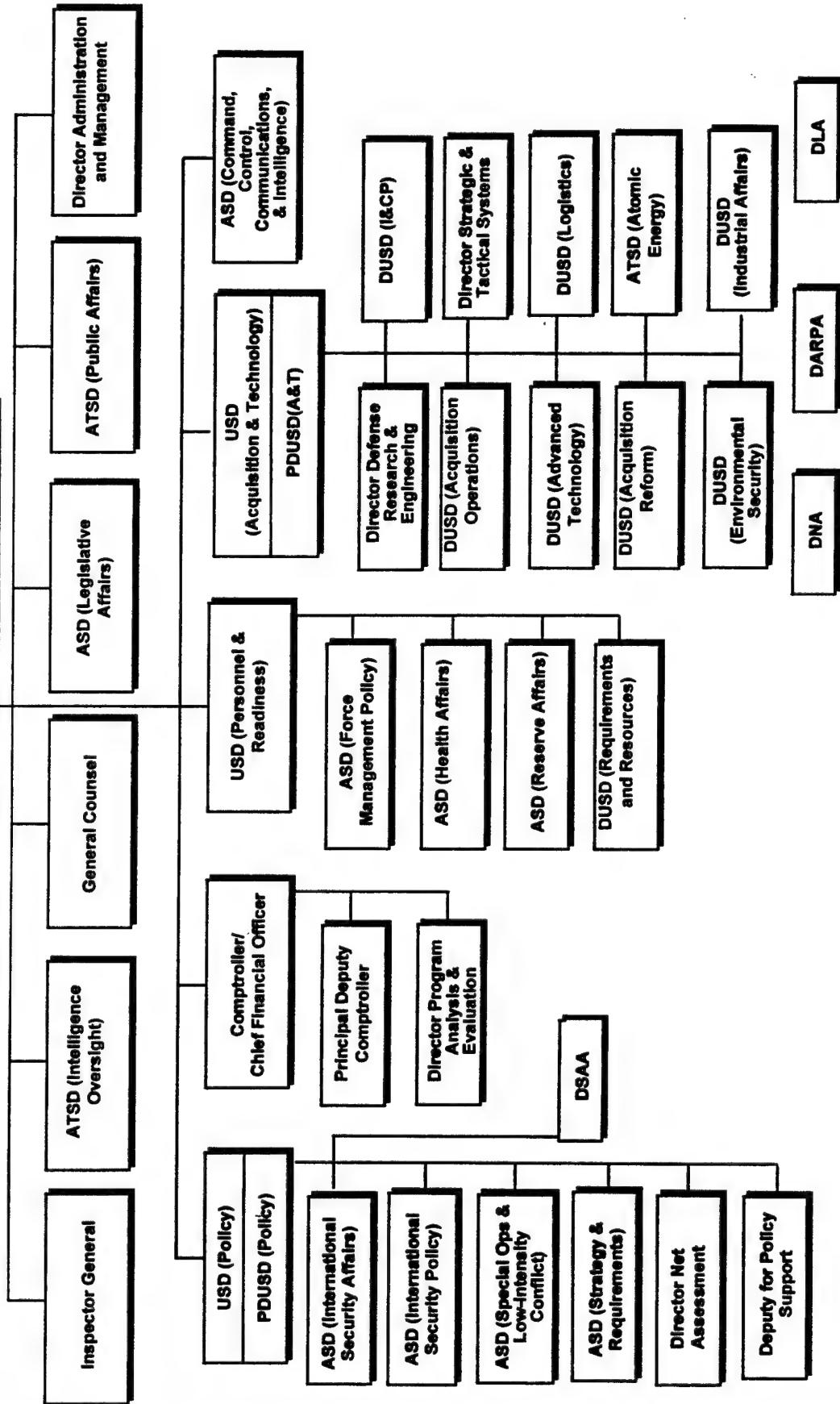


Office of the Secretary of Defense

Secretary of Defense

Deputy Secretary of Defense

Appendix B: OSD Organizational Chart (5)



Appendix C: USD (A&T)
Organizational Chart
(5)



Under Secretary of Defense (Acquisition & Technology)

Honorable Paul G. Kaminski

Director
Special Programs
Defense Science Board
Administration

Director
Program Integration
Mr. Daniel Czeluzniac

Principal Deputy Under
Secretary of Defense (A&T)
Mr. Noel Longuemare

Director, Defense
Research and Engineering
Dr. Anita Jones

Deputy Under Secretary
International and Commercial
Programs
Mr. P. G. Hooper

Assistant to the Secretary
Atomic Energy
Dr. Harold Smith, Jr.

Deputy Under Secretary
Advanced Technology
Mr. Jack Bachkosky

Deputy Under Secretary
Environmental Security
Ms. Sherri Goodman

Deputy Under Secretary
Acquisition Reform
Mrs. Colleen Preston

Deputy Under Secretary
Industrial Affairs
Mr. John Goodman

Deputy Under Secretary
Space
Mr. Robert V. Davis

Deputy Under Secretary
Logistics
Mr. John Phillips

Director
Defense Procurement
Mrs. Eleanor Spector

Director
Strategic & Tactical Systems
Dr. George Schneiter

Director
Ballistic
Missile Defense Organization

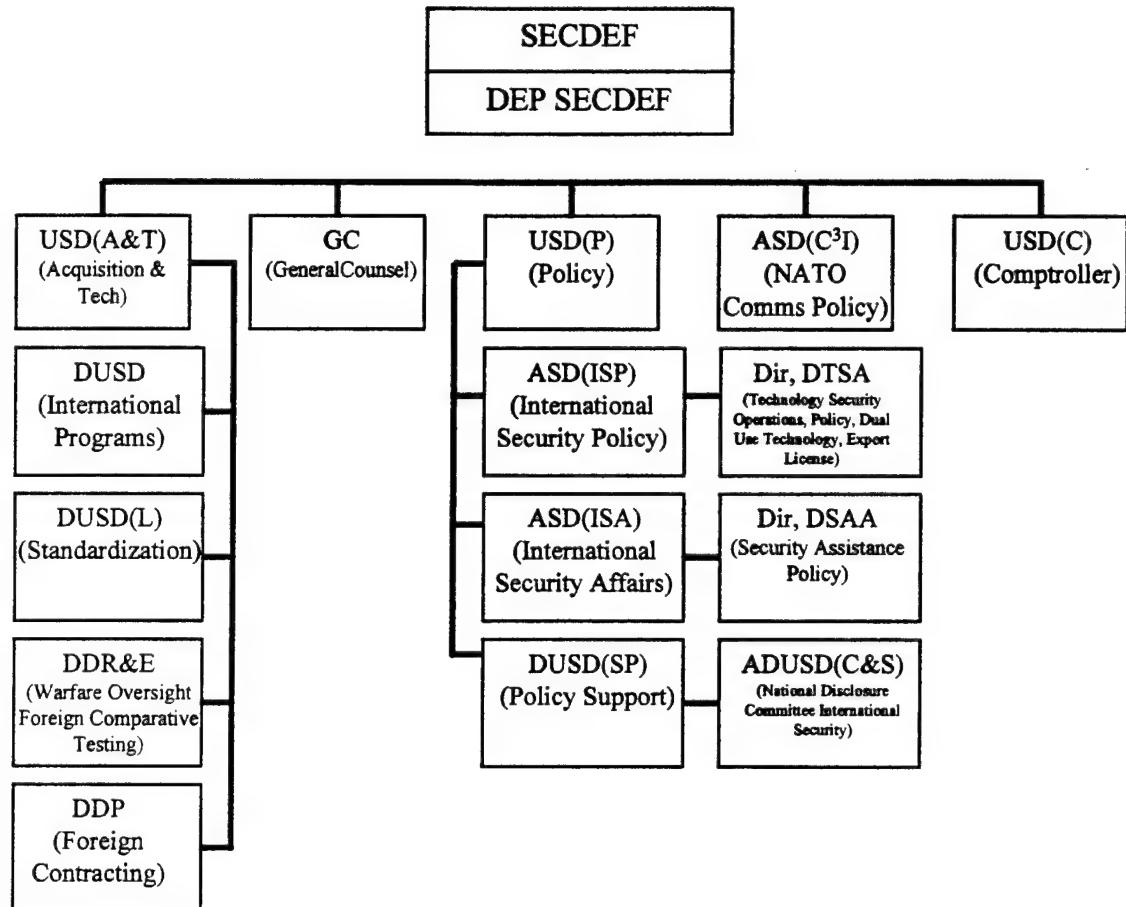
Director
Defense Nuclear Agency
MG Gary L. Curtin

Director
ARPA
Mr. Larry Lynn

Director
Defense Logistics Agency
VAdm Edward Straw

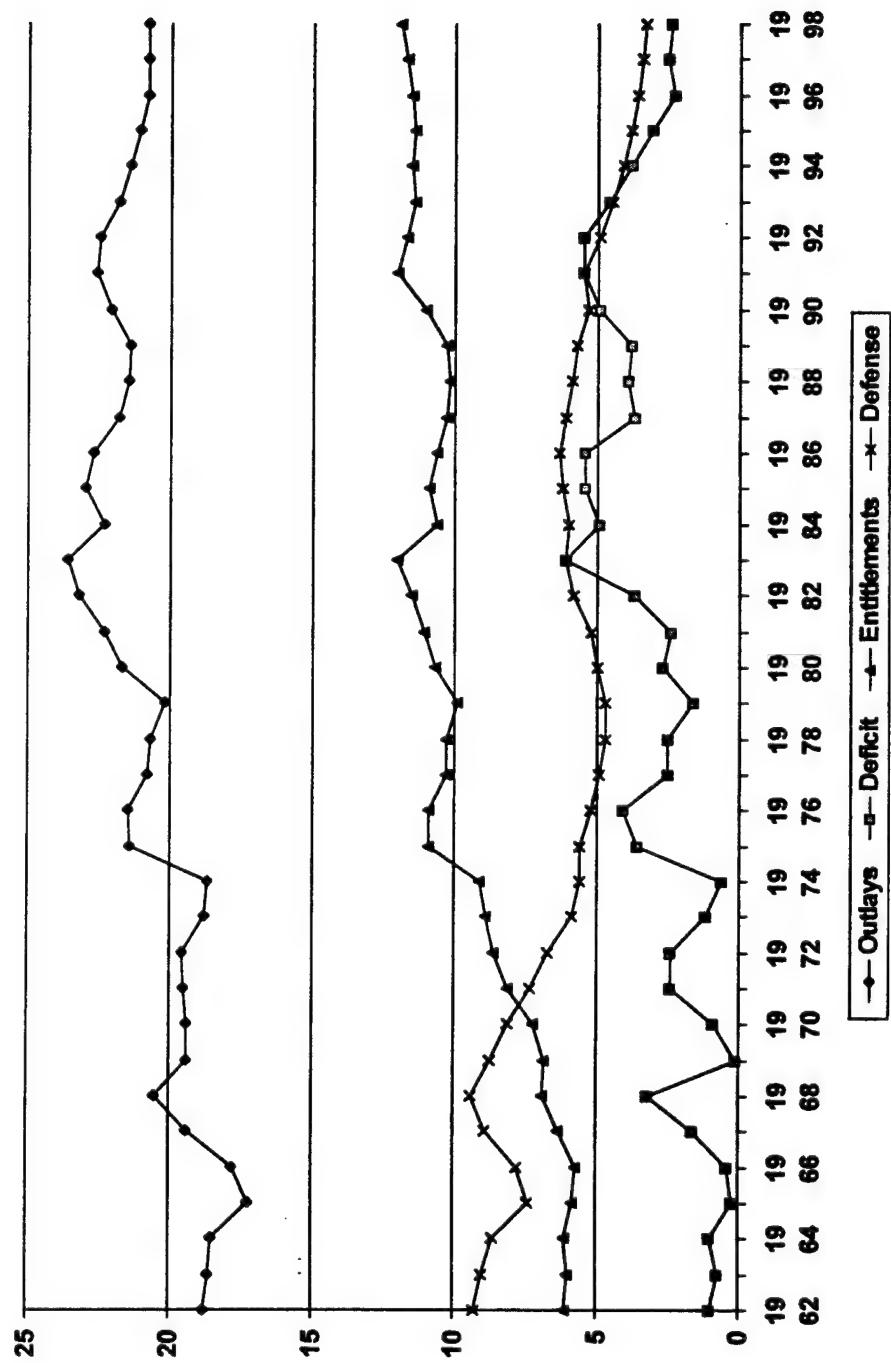
Appendix D: Key International Armaments Cooperation Positions

(13:441)



Appendix E: Federal Budget Categories as Percentages of GDP

Data for the years 1962-1996 are presented as historical. The data for 1997-1998 are projected percentages (3:39).



Appendix F: Defense Industry Acquisitions and Mergers in the 1990s
(31:23)

BOEING

- 1997** - Announced plan to purchase McDonnell Douglas
- 1996** - Purchased Rockwell International
- 1995** - Purchased Litton Precision Gear
- 1990** - Purchased UTL

LITTON INDUSTRIES

- 1994** - Purchased Teledyne Electronic Systems
- Purchased IMO Industries (Electro-optical)
- 1991** - Purchased General Instruments Defense
- 1990** - Purchased Varian Solid State Devices

LOCKHEED MARTIN

- 1997** - Announces plan to purchase Northrop Grumman
- 1996** - Purchases Loral
- 1995** - Lockheed merges with Martin Marietta

NORTHROP GRUMMAN

- 1996** - Purchases Westinghouse ESG
- 1993** - Grumman merges with Northrop
- 1992** - Northrop purchases LTV-Aircraft Operations

RAYTHEON

- 1997** - Announced plan to purchase Texas Instruments DSEG
- 1996** - Purchased Hughes Aircraft
- 1995** - Purchased E-Systems
- 1993** - Purchased Corporate Jets
- 1992** - Purchased TRW-LSI Products
- 1991** - Purchased STC PLC-Navigation Systems
- 1990** - Purchased Remco-SA

**Appendix G: 28 March 1997 Memorandum from Secretary of Defense
William S. Cohen - DoD International Armaments Cooperation Policy**

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DOD FIELD AGENCIES

SUBJECT: DoD International Armaments Cooperation Policy

I have determined that International Armaments Cooperation is a key component of the Department of Defense Bridge to the 21st Century. In the evolving environment of coalition warfare, limited resources, and a global industrial and technology base, it is DoD policy that we utilize International Armaments Cooperation to the maximum extent feasible, consistent with sound business practice and with the overall political, economic, technological, and national security goals of the United States.

We already do a good job of international cooperation at the technology end of the spectrum; we need to extend this track record of success across the remainder of the spectrum, to include major defense systems. We must achieve as a minimum:

- Deployment and support of standardized, or at least interoperable, equipment with our potential coalition partners; and
- Leverage of U.S. resources through cost sharing and economies of scale afforded by international cooperative research, development, production, and logistics support programs.

To attain these objectives, I am directing that:

1. We engage Allies in discussions at the earliest practicable stages to identify common mission problems, and to arrive jointly at acceptable mission performance requirements, balancing cost as an independent variable (affordability), meeting coalition military capability needs, and assuring interoperability;
2. The USD(A&T), in coordination with USD(P) and with the recommendation of the affected DoD component, will designate appropriate defense acquisition programs as international cooperative programs. The DoD must be a reliable international partner by funding fully the U.S. share of such programs. Should circumstances arise which necessitate less than full funding for a designated international cooperative program, the Component Acquisition

3. Executive shall notify the USD(A&T), at the earliest opportunity, of the Component's intent to terminate or substantially reduce funding for the program;
4. In support of designated international cooperative programs, DoD will give favorable consideration to transfers of defense articles, services and technology consistent with national security interests and relevant laws, regulations, policies and international agreements. In the case-by-case consideration of proposed transfers through established internal procedures, any recommendation by DoD reviewing organizations to deny or require conditions for proposed transfers will be accompanied by specific national security rationale;
5. Training for program managers and other Acquisition Workforce personnel will include sufficient instruction in the policies and procedures of international armaments cooperation programs, including export regulations and information and industrial security policies, so as to enable them to develop and execute such programs successfully; and
6. The International Cooperative R&D Program accounts (0603790D, A, N, and F) will be used to enable international armaments cooperation programs to begin at an earlier time than what would otherwise be possible through normal program budgeting. The USD(A&T) will approve projects for funding by these accounts in accordance with this policy.

I request your full support of this policy and task the Armaments Cooperation Steering Committee to ensure that this policy is aggressively pursued.

This policy is effective immediately. Appropriate DoD Directives and Instructions should be amended by their sponsors to reflect this policy with 180 days.

////signed////
William S. Cohen

Appendix H: Interview Protocol

Background Information

During the height of the Cold War, the United States Department of Defense had a focused acquisition effort to produce ACAT1 major fighter weapon systems that would allow the U.S. military to gain and maintain combat air and ground superiority. These weapon systems included the F-14, F-15, F-16, F-18, and F117. They were developed as single service acquisition efforts which significantly increased the overall expenditure of defense funds through the early 1990s. With the collapse of the former Soviet Union, the United States now faces increasing pressure to reduce its defense spending. The use of international cooperative programs to develop future ACAT1 major weapon systems could be considered as a primary alternative to producing major weapon systems as single or joint department (USA, USN, USAF) acquisitions. International cooperative partnerships allow the U.S. to reduce its acquisition expense, strengthen its international political relationships, and gain access to advanced foreign technologies.

The purpose of this thesis effort is to answer the thesis research questions. Through the thorough literature review that has been conducted and this interview process I will answer the thesis questions and draw conclusions concerning the future of U.S. international cooperative development of major weapon systems. I will be using the interview research questions and the supporting interview research questions to guide the interview.

Thesis Research Questions

1. How did international armaments cooperation evolve from the post-World War II era to the present?
2. What are the current policies, practices, and major programs involved in international cooperative development (ICD)?
3. To what degree will international armaments cooperation programs be involved in the development and production of weapon systems in the future?
4. Has a baseline model been developed to guide the acquisition process of major weapon systems that are international cooperative programs?

Interview Research Questions

1. To what degree should an international cooperative partner be involved in an ACAT1 weapon system acquisition? Consider their political, technological and economic roles.
2. What are the primary operational, logistical, and security considerations/concerns of developing an ACAT1 major weapon system as an international cooperative program?
3. What program management requirements must be addressed in order for the U.S. to use the Joint Strike Fighter program as the model baseline for all international cooperative ACAT1 weapon systems?

Supporting Interview Research Questions

Supporting questions for Interview Research Question #1:

- 1a. What type of political agreement would help to foster an equitable relationship between the U.S. and a potential international cooperative partner in an ACAT1 acquisition effort?
- 1b. What are the economic advantages/disadvantages of developing an ACAT1 weapon system as an international cooperative program?
- 1c. How does the rapid change of technology impact the role of an international cooperative partner in an ACAT1 major weapon system acquisition?

Supporting questions for Interview Research Question #2:

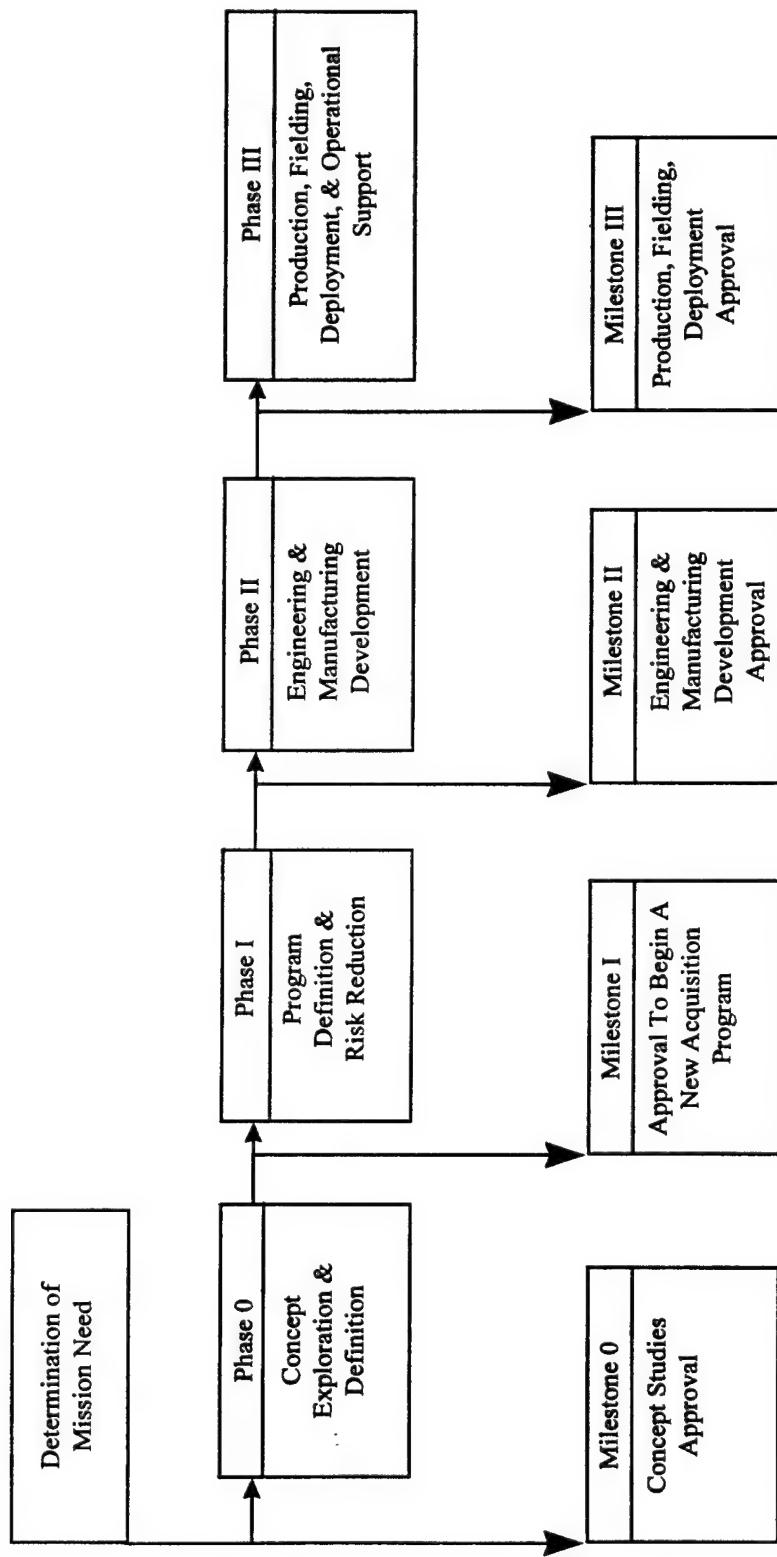
- 2a. How important will it be for U.S. military personnel to be able to maximize international operational interface in future warfare scenarios?
- 2b. What impact will the development of international cooperative ACAT1 major weapon systems have on Integrated Weapon System Management (IWSM), U.S. depots, and Contractor Logistics Support (CLS)?
- 2c. Can current U.S. technology insertion, interface, and transfer policies provide for adequate security of advanced software system configurations in an international cooperative Program?

Supporting questions for Interview Research Question #3:

- 3a. Are the program management policies currently being used for the Joint Strike Fighter program sufficient to be used as a baseline for an international cooperative ACAT1 program in the future?
- 3b. What challenges could be expected from having an international cooperative partner be the Program Director for an international cooperative ACAT1 weapon system that the U.S. is highly involved in?
- 3c. What systems acquisition role will the U.S. have in an international cooperative ACAT1 weapon system acquisition if a U.S. based firm is not the prime contractor? (e.g. Lockheed Martin, Boeing-McDonnell Douglas vs. British Aerospace, etc.)

Appendix I: U.S. DoD Systems Acquisition Model

(20)



Glossary of Acronyms

ACAT	Acquisition Category
AFIT	Air Force Institute of Technology
BMDO	Ballistic Missile Defense Organization
CALS	Continuous Acquisition and Life Cycle Support
CBO	Congressional Budget Office
CLS	Contractor Logistics Support
CTOL	Conventional Take Off and Land
DAB	Defense Acquisition Board
DAE	Defense Acquisition Executive
DoD	Department of Defense
DoN	Department of the Navy
DSB	Defense Science Board
DUSD (I&CP)	Deputy Under Secretary of Defense for International and Commercial Programs
EMD	Engineering Manufacturing Development
FAR	Federal Acquisition Regulation
FASA	Federal Acquisition Streamlining Act
FMS	Foreign Military Sales
FY	Fiscal Year
GPO	Government Printing Office
IACP	International Armaments Cooperation Program
ICD	International Cooperative Development
IEPG	Independent European Programme Group
IPT	Integrated Product Team
IWSM	Integrated Weapon Systems Management

JAST	Joint Advanced Strike Technology
JCCM	Joint Common Cost Model
JIRD	Joint Initial Requirements Document
JORD	Joint Operational Requirements Document
JROC	Joint Requirements Oversight Council
JSF	Joint Strike Fighter
MEADS	Medium Extended Air Defense System
MIDS	Multifunctional Information Distribution System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAD	National Armaments Director
NATO	North Atlantic Treaty Organization
OSD	Office of the Secretary of Defense
QDR	Quadrennial Defense Review
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
RSI	Rationalization Standardization and Interoperability
S&T	Science and Technology
STOVL	Short-Takeoff and Vertical-Landing
TMD	Theater Missile Defense
USD (A&T)	Under Secretary of Defense for Acquisition and Technology

Glossary of Relevant Terms

Unless noted otherwise, these terms and definitions are taken from the Defense Systems Management College *Glossary: Defense Acquisition Acronyms and Terms, Sixth Edition, March 1995* (16).

Acquisition The conceptualization, initiation, design, development, test, contracting, production, deployment, and logistic support, modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in or in support of military missions.

Acquisition Category (ACAT) Categories established to facilitate decentralized decision making and execution and compliance with statutorily imposed requirements. The categories determine the level of review, decision authority, and applicable procedures.

1. **Acquisition Category I.** These are “major defense acquisition programs.” They have unique statutorily imposed acquisition strategy, execution, and reporting requirements. Milestone decision authority for these programs is the:
 - (a) Under Secretary of Defense for Acquisition – acquisition category I D – or, if delegated by the Under Secretary, the
 - (b) Cognizant DoD Component Head – acquisition category I C – or, if delegated by the Component Head, the Component Acquisition Executive.
2. **Acquisition Category II.** Milestone decision authority for these programs is delegated no lower than the DoD Component Acquisition Executive. They have unique statutorily imposed requirement in the test and evaluation area.
3. **Acquisition Category III and IV.** The additional distinction of acquisition categories III and IV allow DoD Component Heads to delegate milestone decision authority for these programs to the lowest level deemed appropriate with their respective organization.

Acquisition Life Cycle The life of an acquisition program consists of phases, each preceded by a milestone or other decision point, during which a system goes through research, development, test and evaluation and production. [The phases are: (0) Concept Exploration and Definition, (1) Program Definition and Risk Reduction, (2) Engineering

Manufacturing and Development, (3) Production, Fielding, Deployment, & Operational Support]

Acquisition Logistics The process of systematically identifying and assessing logistics alternatives, analyzing and resolving logistics deficiencies, and managing integrated logistic support throughout the acquisition process.

Acquisition Program A directed, funded effort that is designed to provide a new or improved materiel capability in response to a validated need.

Acquisition Strategy A business and technical management approach designed to achieve program objectives within specified resource constraints. It is the framework for planning, directing, and managing a program. It provides a master schedule for research, development, test, production, fielding and other activities essential for program success, and for formulating functional plans, and strategies.

Acquisition Streamlining Any effort that results in more efficient and effective use of resources to design and develop, or produce quality systems. This includes ensuring that only necessary and cost-effective requirements are included, at the most appropriate time in the acquisition cycle, in solicitations and resulting contracts for the design, development, and production of new systems, or for modifications to existing systems that involve redesign of systems or subsystems.

Affordability A determination that the life-cycle cost of an acquisition program is in consonance with the long-range investment and force structure plans of the DoD or individual DoD Components.

Approved Project A cooperative project under 22 USC 2767 that has DoD Component approval for implementation, or a cooperative R&D project under 10 USC 2350a that has OSD approval for implementation, before any formal agreements have been negotiated or concluded and funds are released.

Armaments Weapons with lethal capability (e.g., missiles, rifles.)

Arms Export Control Board An interagency board, chaired by the Under Secretary of State for Security Assistance, Science and Technology, that serves to advise the Secretary of State on matters relating to security assistance program levels and arms transfer policies.

Baseline Comparison System A current operational system, or a composite of current operational subsystems, which most closely represents the design, operational, and support characteristics of the new system under development.

Budget A comprehensive financial plan for the Federal Government, encompassing the totality of Federal receipts and outlays (expenditures).

Buy-American Act Provides that the U.S. government generally give preference to domestic end products. (41 USC 10 A-D). This preference is accorded during price evaluation process by applying punitive evaluation factors to most foreign products. Subsequently modified (relaxed) by Culver-Nunn Amendment (1977) and other 1979 trade agreements for dealing with NATO allies.

Co-Development Systems or subsystems cooperatively designed and developed in two or more countries. Shared responsibilities include design and engineering, and may be expanded to include applied research.

Collaboration - The international coproduction or codevelopment of a weapon system such as the codevelopment examples above (13:446).

Commonality A quality which applies to materiel or systems possessing like and interchangeable characteristics enabling each to be utilized or operated and maintained by personnel trained on the others without additional specialized training; and/or having interchangeable repair parts and/or components. Applies to consumable items interchangeable without adjustment.

Compatibility The compatibility of two or more operational items/systems to exist or function as elements of a larger operational system or operational environment without mutual interface. Applies to multi-service or multi-national use.

Consortium A group of contractors acting in a prime contractor/subcontractor relationship, joint venture, or other cooperative relationship.

Cooperative Logistics This term is used to refer to any international cooperation between the United States and one or more allied or friendly nation or international organization in the logistical support of weapons or other defense systems and equipment used in the armed forces of the cooperating partners.

Cooperative Programs 1. Cooperative programs comprise one or more specific cooperative projects that are conducted under an international agreement and that are:

- a. Implemented under: (1) Title 22 United States Code (Arms Export Control Act), to include the specific provisions of 22 USC 2767 regarding cooperative projects with friendly foreign countries. (2) Title 10 United States Code (Armed Forces), to include the specific provisions of 10 USC 2350a regarding cooperative research and development programs with allied countries.
- b. Undertaken with one or more of the following general objectives:

- (1) Supplying the best available defense goods and services to the United States, its allies, and other friendly countries in the most timely and cost-effective manner practicable.
- (2) Making the most efficient use of the scientific, technical, industrial and financial resources available for the defense of the United States, its allies, and other friendly countries.
- (3) Facilitating multilateral military operations in times of emergency or hostilities involving the United States, its allies, and other friendly countries by promoting:
 - (a) The standardization or interoperability of equipment relevant to those operations.
 - (b) Common or mutually consistent logistic support for the forces potentially involved in those operations.
 - (c) Conducted in the following general areas:
 - (1) Research, development, test, and evaluation of defense articles (including cooperative upgrade or other modification of a U.S. developed system).
 - (2) Joint production (including follow-on support) of a defense article that was developed by one or more of the participants.
 - (3) Procurement by the United States of a foreign defense article (including software), technology (including manufacturing rights), or service (including logistic support).
 - (4) Testing under the Foreign Comparative Testing Program on non-development items and selected technologies (including data) originated solely by allied or friendly countries.

2. Cooperative programs so defined exclude programs that entail acquisition for solely foreign military requirements, as distinct from joint U.S./foreign military requirements. Acquisition for solely foreign military requirements will be satisfied through either Foreign Military Sales (FMS) or direct commercial transactions with U.S. contractors. Government-to-government agreements relating to acquisition for foreign military requirements may include procurement from U.S. production, foreign coproduction, or licensed production of a wholly U.S.-developed weapon system.

Cooperative R&D - A program where the U.S. DoD and a foreign defense ministry by written agreement jointly manage and R&D effort. An excellent example is an R&D effort between the U.S. and Japan to demonstrate a ducted rocket engine for a medium SAM which will increase the envelope against aircraft cruise missiles and tactical ballistic missiles (13:446).

Co-Production Programs 1. Coproduction programs comprise those programs in which the U.S. Government enable an eligible foreign government, international

organization or designated commercial producer to acquire the technical data and know-how to manufacture or assemble in whole or in part an item of U.S. defense equipment for use in the defense inventory of the foreign government. 2. Coproduction programs so defined may be implemented through any one or a combination of international agreements, Letters of Offer and Acceptance (LOAs) and direct commercial agreements subject to USG export licenses.

Defense Cooperation Defense cooperation is a generic term for the range of activity undertaken by the U.S. DoD with its allies and other friendly nations to promote international security. Such activity includes, but need not be confined to, security assistance, industrial cooperation, armaments cooperation, Foreign Military Sales, training, logistics cooperation, cooperative Research and Development, Foreign Comparative Testing, and Host Nation Support.

Defense Industrial Support Activities undertaken pursuant to a government-to-government agreement to foster cooperation in R&D, production and procurement, and logistics support of defense equipment that emphasizes joint production of systems to satisfy the military requirements of one or more allied or friendly nations in coordination with the United States.

Dual Production In NATO context, production of a weapon system in Europe and U.S. refers not only to independent production lines for entire systems, but also to interdependent components production.

Family of Weapons - A division of labor among the participating governments involving several related weapon systems. The participating countries separately develop a particular weapon within the group and then permit the other participants to produce that weapon for themselves. Used by NATO. Used "successfully" by Britain and France during the late 1960s with the family of utility helicopters called Lynx/Puma/Gazelle. Also was used in 1978 "for the NATO ASRAAM/AMRAAM program, which turned out to be a collaboration nightmare" by the late 1982, according to a 1993 Defense Budget project study (13:446).

Foreign Comparative Testing (FCT) A project that tests and evaluates a foreign technique, process, or other subset of a system architecture with the intent of applying that technology to an identified conventional U.S. military system.

Foreign Military Sales (FMS) That portion of U.S. security assistance authorized by the Foreign Assistance Act of 1961, and the Arms Export Control Act. The recipient provides reimbursement for defense articles and services transferred from the U.S. Includes cash sales from stocks (inventories, services, training) by the DoD defense services.

Harmonization Refers to the process, or results, of adjusting differences or inconsistencies in the qualitative basic military requirements of the United States, its allies, and other friendly countries. It implies that significant features will be brought into line so as to make possible substantial gains in terms of the overall objectives of cooperation (e.g., enhanced utilization of resources, standardization and compatibility of equipment). It implies especially that comparatively minor differences in "requirements" should not be permitted to serve as a basis for the support of slightly different duplicative programs and projects.

Industrial Base That part of the total private and Government owned industrial production and depot level equipment and maintenance capacity in the Untied States and its territories and possessions, and Canada. It is or shall be made available in an emergency for the manufacture of items required by the U.S. Military Services and selected Allies.

Integrated Logistic Support (ILS) A disciplined, unified, and iterative approach to the management and technical activities necessary to integrate support considerations into system objectives, to design, and to each other; acquire the required support; and provide the required support during the operational phase at minimum cost.

International Agreement Any agreement concluded with one or more foreign governments or an international organization that (a) is signed or agreed to by any DoD Component personnel; (b) signifies the intent of the parties to be bound by international law; and (c) is denominated as an international agreement or an MOU, memorandum of agreement (MOA), exchange of notes or letters, technical arrangement, protocol, note verbal aide memoire, contract, arrangement, or any other name connoting a similar legal consequence.

Interoperability The ability of systems, units, or forces to provide services to or accept services from other systems, units, or forces, and to use the services so exchanged to operate effectively together.

Joint Acquisition Program A directed joint effort for the development and procurement of systems, sub-systems, equipment, software, or munitions as well as supporting equipment or systems, with the goal of providing a new or improved capability for a validated joint need. Certain modification programs may be included when they are determined to be of significant interest or priority to the participating services.

Licensed Production - The transnational sale of the rights to manufacture a weapon system originally developed within the supplier country. Up until early 1980s, this was the preeminent form of globalization of weapon systems, according to a December 1993 report by the Defense Budget Project. Examples include the Honeywell-Mitsubishi heavy

Industries (Japan) MK46 MOD 5 Lightweight torpedo; the McDonnell Douglas F-15J Eagle fighter in Japan; and the Lockheed F-16 fighter in South Korea (13:446).

Life-Cycle Management Process for administering system hardware, software, or support over its whole life, with emphasis on strengthening early decisions which shape costs and utility.

Line Replaceable Unit (LRU) An essential support item removed and replaced at field level to restore end item to an operationally ready condition.

Maintenance Planning The process conducted to evolve and establish maintenance concepts and requirements for the lifetime of a material system; one of the principal elements of ILS [Integrated Logistics Support].

Major Defense Acquisition Program (MDAP) An acquisition program that is not a highly sensitive classified program (as determined by the Secretary of Defense) and that is: Designated by the Under Secretary of Defense for Acquisition as a major defense acquisition program, or estimated by the Under Secretary of Defense for Acquisition to require: (1) An eventual total expenditure for research, development, test, and evaluation of more than \$300 million in fiscal year 1990 constant dollars, or (2) An eventual total expenditure for procurement of more than \$1.8 billion in fiscal year 1990 constant dollars.

Memorandum of Understanding (MOU) Official agreements concluded between the defense ministries of NATO nations and ranking below government-level international treaties. Defacto agreements that are generally recognized by all partners as binding even if no legal claim could be based on the rights and obligations laid down in them.

Mergers and Acquisition - The purchase of shares in a defense firm by a defense company in another country, up to gaining majority control in that firm. Most of the defense-related mergers and acquisitions have occurred since 1986. Major examples are Deutsche Aerospace (DASA) purchase of a controlling interest in Fokker, a Dutch aerospace firm; and Sieman's (Germany) and GEC-Marconi's (UK) joint purchase of Plessey (UK) (13:446).

Military Assistance Program The U.S. program for providing military assistance under the Foreign Assistance Act of 1961, as amended and by the Foreign Military Sales Act of 1968.

National Disclosure Policy Promulgates national policy and procedures in the form of specific disclosure criteria and limitations, definitions of terms, release arrangements, and other guidance required by U.S. departments and agencies having occasion to release classified U.S. information. In addition, it establishes and provides for the management

of an interagency mechanism and procedures that are required for the effective implementation of the policy.

Offset Agreements Any agreement made by DoD to purchase foreign items to offset some specific amount or percentage of that country's expenditures in the U.S. for U.S. defense items.

Operational Requirements user-or user representative-generated validated needs developed to address mission area deficiencies, evolving threats, emerging technologies or weapon system cost improvements. Operational requirements form the foundation for weapon system unique specifications and contract requirements.

Prime Contractor A contractor having responsibility for design control and delivery of a system or equipment such as aircraft, engines, ships, tanks, vehicles, guns and missiles, ground communications and electronic systems, ground support equipment, and test equipment.

Program Acquisition Cost The estimated cost of development (RDT&E), procurement, and system specific military construction (MILCON) necessary to acquire the defense system. RDT&E costs are accumulated from the point in time when the DoD acquisition program is designated by title as a program element or major project within a program element. MILCON costs include only those projects that directly support and uniquely identify with the system.

Program Management The process whereby a single leader exercises centralized authority and responsibility for planning, organizing, staffing, controlling, and leading the combined efforts of participating/assigned civilian and military personnel and organizations, for the management of a specific defense acquisition program or programs, through development, production and deployment.

Research and Development Costs Those program costs primarily are associated with R&D efforts including the development of a new or improved capability to the point where it is ready for operational use. They include equipment costs funded under RDT&E appropriations and related military construction appropriation costs. They exclude costs which appear in the military personnel, operation and maintenance, and procurement appropriations.

Research, Development, Test and Evaluation (RDT&E) Activities for the development of a new system that include basic and exploratory research, advanced and engineering development, developmental and operational testing, and the evaluation of test results.

Simulation A simulation is a method for implementing a model. It is the process of conducting experiments with a model for the purpose of understanding the behavior of

the system modeled under selected conditions or of evaluating various strategies for the operation of the system within the limits imposed by developmental or operational criteria. Simulation may include the use of analog or digital devices, laboratory models, or "testbed" sites. Simulations are usually programmed for solution on a computer; however, in the broadest sense, military exercises and wargames are also simulations.

Standardization The process by which DoD achieves the closest practicable cooperation among forces; the most efficient use of research, development, and production resources; and agree to adopt on the broadest possible basis the use of (a) common or compatible operational, administrative, and logistics procedures and criteria; (b) common or compatible technical procedures and criteria; (c) common or compatible, or interchangeable supplies, components, weapons, or equipment; and (d) common or compatible tactical doctrine with corresponding organizational compatibility.

Supportability The degree to which system design characteristics and planned logistics resources, including manpower, meet system peacetime readiness and wartime utilization requirements.

System Program Office the office of the program manager and the single point of contact with industry, Government agencies and other activities participating in the system acquisition process.

Tailoring (Joint Program) The process of evaluating potential requirements of the participating services to determine their pertinence and costs effectiveness for a specific system or equipment joint acquisition, and modifying these requirements to ensure that each contributes to an optimal balance between the needs of the participating services and costs.

Teaming An agreement of two or more firms to form a partnership or joint venture to act as a potential prime contractor; or an agreement by a potential prime contractor to act as a subcontractor under a specified acquisition program; or an agreement for a joint proposal resulting from a normal prime contractor-subcontractor, licensee-licenser, or leader company relationship.

Technology Base The development efforts in basic research and exploratory development.

Two-Way Street Philosophy encouraging U.S. to buy arms from, in addition to selling arms to NATO and other friendly nations.

Win-Win A philosophy whereby all parties in a defense acquisition scenario come away gaining some or most of what they wanted (i.e., everyone "wins" something, even though it may not be 100% of goal), the ideal outcome.

Work Share “Work Share” is that portion of the contract work which a Participant’s industrial concerns receive under the APGM contracts. For calculating the contract work shares, only contracts awarded at the level of prime contractor, his subcontractors (first tier subcontractors) and the latter’s subcontractors (second tier subcontractors) will be considered. Subcontractor tiers below second tier subcontractors will not be considered in the assessment of work shares. Subcontractors that are organized as a purely legal entity comprised of more than one firm will not be considered as a subcontracting level.

Bibliography

1. A New Strategy for Science and Technology. From the executive summary of the National Security Science and Technology Strategy, published by the Office of Science and Technology Policy, Executive Office of the President, September 19, 1995. WWWeb, <http://www.dtic.mil/defenselink/pubs/di95/di1094>, (14 Apr 97).
2. Abati, Colonel Dave, Director, Armaments Cooperation Division, Office of the Deputy Under Secretary of the Air Force, International Affairs. Personal interview. 29 May 1997.
3. Air Force Magazine USAF Almanac 1997: 39-40 (May 1997).
4. Bittleston, Martyn. Adelphi Papers 250: Cooperation or Competition? Defense Procurement Options for the 1990s. London: Brassey's, Spring 1990.
5. Bruce, Mr. Robert, Director, Armaments Cooperation Atlantic, Office of the Under Secretary of Defense Acquisition and Technology, International Armaments Cooperation, briefing given to the Advanced International Management Workshop. Briefing charts provided to support the personal interview conducted 29 May 1997.
6. Buzzell, Colonel Bill, Deputy Director International Affairs, Joint Strike Fighter System Program Office. Personal interview. 28 May 1997.
7. Campbell, Thomas M., Jr. "NATO and the United Nations in American Foreign Policy: Building a Framework for Power," in NATO After Thirty Years. Edited by Lawrence S. Kaplan and Robert W. Clawson. Wilmington DE: Scholarly Resources Inc., 1981.
8. Carlton, James R. "NATO Standardization: An Organizational Analysis," in NATO After Thirty Years. Edited by Lawrence S. Kaplan and Robert W. Clawson. Wilmington DE: Scholarly Resources Inc., 1981.
9. Coakley, Thomas P. Command and Control for War and Peace. Washington DC: National Defense University Press, January 1992.
10. Cohen, R.I. Psychological Testing and Assessment: An Introduction to Test and Measurements, (Second Edition). Mountainview: Mayfield Press, 1992.
11. Cohen, Honorable William S., U. S. Secretary of Defense. DoD International Armaments Cooperation Policy Memorandum, 28 March 1997.

12. Defense Budget - Procurement and Research and Development (R&D). WWWeb, <http://www.dtic.mil/cgi-bin/waisga>, (14 Apr 97).
13. Defense Institute of Security Assistance. The Management of Security Assistance, 16th Edition. Wright-Patterson AFB OH: April 1996.
14. Defense Science Board Task Force. International Armaments Cooperation in an Era of Coalition Security. A report by the Defense Science Board Task Force on International Armaments Cooperation. Washington DC: GPO, August 1996.
15. Deibel, Terry L. "Strategies Before Containment: Patterns for the Future," in America's Strategy in a Changing World. Edited by Sean M. Lynn-Jones and Steven E. Miller. Cambridge MA: The MIT Press, 1993.
16. Department of Defense. GLOSSARY: Defense Acquisition Acronyms & Terms (Sixth Edition), Defense Systems Management College, Acquisition Policy Department. Fort Belvoir VA: GPO, March 1995.
17. Department of Defense. Guide for the Management of Multinational Programs (Second Edition), Defense Systems Management College. Fort Belvoir VA: GPO, 1987.
18. Department of Defense. International Cooperative Research and Development Program 1997 Report to Congress. A report prepared by the Office of the Under Secretary of Defense for Acquisition and Technology submitted to the Speaker of the House of Representatives and the Committees on Armed Services and Appropriations of the Senate. Washington DC: GPO, 1997.
19. Department of Defense. Management Plan for the Administration of DoD International Cooperative Research and Development Program. Office of the Under Secretary of Defense for International Programs. Washington DC: GPO, December 1992.
20. Department of Defense. Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs. DoD Directive 5000.2. Washington DC: GPO, Mar 1996.
21. Department of Defense. Report of the Quadrennial Defense Review. Office of the Secretary of Defense. Washington DC: GPO, May 1997.
22. Department of Defense. Report on the Effects of Mergers in the Defense Industry. Office of the Secretary of Defense. Washington DC: GPO, March 1997.

23. Department of the Air Force. US Air Force Participation in International Cooperative Research, Development, and Acquisition (ICRD&A). AFI 16-110. Washington: HQ USAF, 1 November 1995.
24. Emery, Brigadier General Curtis H. II, Deputy for Theater and Air Missile Defense, Ballistic Missile Defense Organization. Statement made before the House National Security Committee and Subcommittees on Research and Development and Procurement, March 19, 1997. WWWeb,
http://www.fas.org/spp/starwars/congress/1997_h/s9703199e, (22 Jul 97).
25. Emory, C. William and Donald R. Cooper. Business Research Methods, (Fourth Edition). Homewood IL: Richard D. Irwin, Inc., 1991.
26. Farinelli, Colonel Mauro, Director International Affairs, Air Force Security Assistance Center. Personal interview. Conducted during the week of 2 June 1997.
27. Farr, C. Michael. "Managing International Cooperative Projects: Rx for Success," in Global Arms Production: Policy Dilemmas for the 1990's. Edited by Ethan B. Kapstein. New York: University Press of America, Inc., 1992.
28. Galbraith, John Kenneth. "The Autonomous Military Power: An Economic View," in The Economics of International Security. New York: Scholarly and Reference Division, St. Martins Press, Inc., 1994.
29. Goodman, Glenn W. Jr. "JSF Downselect: It's Now a Two-Team Race," in Armed Forces International: 28 (December 1996).
30. Goodman, Glenn W. Jr. "Getting Down to Business," in Armed Forces International: 16 (February 1997).
31. Gregory, Bill. "Time is Running Out," in Armed Forces International: 20-24 (July 1997).
32. Hicks & Associates, Inc. International Armaments Cooperation in the Post-Perry & Kaminski Era. A June 12, 1997 paper written by their office which examines the "various elements of the institutional framework for cooperation which now exists" since Secretary of Defense Bill Perry and Under Secretary of Defense for Acquisition and Technology, Dr. Paul Kaminski, departed from the U.S. Department of Defense.
33. Hicks, Stan, Director International Armaments Cooperation, Navy International Programs Office, Washington DC. Personal interview. 29 May 1997.

34. Hoeper, Paul J., Deputy Under Secretary of Defense for International and Commercial Programs. International Armaments Cooperation for the New Millennium. Presented to the Defense Industry Consultative Committee (DICC). WWWeb, http://www.acq.osd.mil/icp/speeches/dicc_speech.htm, (28 July 97).
35. Hoeper, Paul J., Deputy Under Secretary of Defense for International and Commercial Programs. Personal interviews. 29-30 May 1997.
36. International Armaments Cooperation Handbook. Office of the Deputy Under Secretary of Defense for International & Commercial Programs. Washington DC: GPO, June 1996.
37. Johnson, Joel L. "The United States: Partnerships with Europe," in Global Arms Production: Policy Dilemmas for the 1990's. Edited by Ethan B. Kapstein. New York: University Press of America, Inc., 1992.
38. Joint Strike Fighter Program Master Plan, 1996. WWWeb, <http://www.jast.mil/MasterPlan/1996>, (17 Apr 97).
39. Joint Strike Fighter Program White Paper, February 1997. WWWeb, <http://www.jast.mil/whtpapr.html>, (13 May 97).
40. Joint Strike Fighter Program: MOD Briefing, May 13, 1997. WWWeb, <http://www.jast.mil>, (17 Apr 97).
41. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Acquisition Challenge: Affordable Technological Supremacy. Remarks made at the Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington DC, January 27, 1995. WWWeb, <http://www.dtic.mil/defenselink/pubs/di95/di1011>, (14 Apr 97).
42. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Cooperating in a Competitive Environment. Remarks made at the Center for Strategic and International Studies Inaugural Conference, Washington DC, February 27, 1995. WWWeb, <http://www.dtic.mil/defenselink/pubs/di95/di1022>, (14 Apr 97).
43. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Horizons in Armaments Cooperation. Keynote address to The CSIS Atlantic Partnership Project, Washington DC, March 27, 1996. WWWeb, <http://www.acq.osd.mil/ousda/speech/arms coop>, (22 Jul 97).

44. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Address to the ComDef 96 Conference, Omni Shoreham Hotel, Washington DC, April 1, 1996. WWWeb, http://www.acq.osd.mil/ousda/speech/intl_partnerships.txt, (28 Jul 97).
45. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Statement made before the House Committee on National Security and the Subcommittees on Military Research & Development and Military Procurement, September 27, 1996. WWWeb, <http://www.fas.org/spp/starwars/congress/1996>, (22 Jul 97).
46. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Statement made at a DoD News Briefing, November 16, 1996. WWWeb, <http://www.acq.osd.mil/ousda/speech>, (28 Jul 97).
47. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Statement before the Subcommittee on Research & Development and the Subcommittee on Procurement of the House Committee on National Security on the DoD Tactical Aviation Modernization Program, March 5, 1997. WWWeb, <http://www.acq.osd.mil/ousda/speech>, (14 Apr 97).
48. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Statement made before the Acquisition and Technology Subcommittee of the Senate Committee on Armed Services on DoD FY 1998 Acquisition and Technology Programs, March 11, 1997. WWWeb, <http://www.acq.osd.mil/ousda/speech>, (14 Apr 97).
49. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. Statement before the Acquisition and Technology Subcommittee of the Senate Committee on Armed Services on Defense Acquisition Reform, March 19, 1997. WWWeb, <http://www.acq.osd.mil/ousda/speech>, (14 Apr 97).
50. Kaminski, Honorable Paul G., Under Secretary of Defense for Acquisition and Technology. "Reengineering the Acquisition Process: An Interview with Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology," in Armed Forces Journal International: 54-55 (June 1997).
51. Kapstein, Ethan Barnaby. Global Arms Production: Policy Dilemmas for the 1990's. Edited by Ethan B. Kapstein. New York: University Press of America, Inc., 1992.
52. Kapstein, Ethan Barnaby. The Political Economy of National Security. New York: McGraw-Hill, Inc., 1992.

53. Lipgens, Walter. "NATO and the European Community," in NATO After Thirty Years. Edited by Lawrence S. Kaplan and Robert W. Clawson. Wilmington DE: Scholarly Resources Inc., 1981.
54. Longuemare, The Honorable R. Noel, Under Secretary of Defense for Acquisition and Technology. Personal interview. 28 May 1997.
55. Lopez, Virginia C. and Loren Yeager. The US Aerospace Industry and the Trend Toward Internationalization. Washington DC: Aerospace Research Center, March 1988.
56. Lopez, Virginia C. and David H. Vadas. The U.S. Aerospace Industry in the 1990's: A Global Perspective. Washington DC: Aerospace Research Center, September 1991.
57. Lorell, Mark A. Multinational Development of Large Aircraft: The European Experience. Santa Monica CA: The RAND Corporation, July 1980.
58. Medium Extended Air Defense System Fact Sheet. WWWeb, <http://www.acq.osd.mil/bmdo/bmdolink/pdf/97013.pdf>, (28 Jul 97).
59. Money, The Honorable Arthur L., Assistant Secretary of the Air Force for Acquisition. Personal interview. 28 May 1997.
60. Morrocco, John D. "Cost, Politics Impede European Efforts," in Aviation Week and Space Technology: 52-54 (March 3, 1997).
61. Mozden, Stanley W. Jr. Military Assistance Training Program: A Military Instrument of Foreign Policy. MA thesis, Pittsburgh: University of Pittsburgh, 1964.
62. National Defense Panel. Assessment of the May 1997 Quadrennial Defense Review. Conducted by the National Defense Panel, May 15, 1997. Washington: GPO, 1997.
63. Nunn, Jack. "Arms Cooperation in the Pacific Basin," in Global Arms Production: Policy Dilemmas for the 1990's. Edited by Ethan B. Kapstein. New York: University Press of America, Inc., 1992.
64. Pallas, Spiros G., Principle Deputy Director for Strategic and Tactical Systems, Office of the Under Secretary of Defense for Acquisition and Technology. Personal interview. 28 May 1997.
65. Patton, Michael Quinn. Qualitative Evaluation and Research Methods. Newbury Park CA: SAGE Publications, Inc., 1980.

66. Perry, Honorable William J., former Secretary of Defense. DoD News Briefing, November 16, 1996. WWWeb, <http://www.acq.osd.mil/ousda/speech>, (28 Jul 97).
67. Rosner, Jeremy D. "NATO Enlargement: What Will the Congress and Public Say," in Armed Forces Journal International: 8-10 (April 1997).
68. Schmitt, N.W. and R. J. Klimoski. Research Methods in Human Resource Management. Cincinnati OH: Southwestern Publishers, 1991.
69. Sullivan, Patricia and Rachel Spilka. "Qualitative Research in Technical Communication: Issues of Validity, Identity, and Use," in Technical Communication, Fourth Quarter, 1992.
70. United States Congress. A Look at Tomorrow's Tactical Air Forces. Congressional Budget Office Study. Washington DC: GPO, January 1997.
71. Volkman, Alfred G., Assistant Deputy Under Secretary of Defense for International and Commercial Programs. Personal interview. 29 May 1997.
72. Webb, Simon. NATO in 1992: Defense Acquisition and Free Markets. Santa Monica CA: The RAND Corporation, July 1989.
73. Widnall, Dr. Sheila, Secretary of the Air Force. Remarks prepared for the Air Force Association National Symposium, Dayton OH, July 18, 1997.
74. Yin, Robert K. Case Study Research: Design and Methods. Newbury Park CA: SAGE Publications Inc., 1989.
75. Zettler, Brigadier General Michael E., Director of Maintenance, Office of the Deputy Chief of Staff of the Air Force, Installations and Logistics. Personal interview. 28 May 1997.

Vita

First Lieutenant Paul L. Hartman was born in Oklahoma City, Oklahoma in February 1964. He graduated from Moore High School, Moore, Oklahoma in 1982 and the University of Maryland with a BS in Business Management in 1990. He was commissioned through the Air Force Officer Training School. After receiving his commission, Paul was assigned to Aeronautical Systems Center (ASC), Wright-Patterson AFB, OH where he served in various staff positions to include Chief, Program Management Officer Assignments; Project Officer for the ASC Vice Commander; and Acquisitions Project Officer, F-22 System Program Office, ASC/YF. In 1996, he was accepted to attend the Air Force Institute of Technology (AFIT) where he graduated with a MS in Acquisition Logistics in September 1997. He will also complete his MA in International Affairs (M.A.I.A) from the University of Dayton in May 1998. After graduating from AFIT, Paul was assigned as the AC-130U Acquisition Logistics Project Manager, Special Operations Forces Mission Area Group, Aeronautical Systems Center, Wright-Patterson AFB, OH. He is married to the former Kathy O'Roark of Cape Cod, MA. Paul has two boys, Corbin age 6 and Bailey age 4. Paul has dedicated the accomplishment of this thesis to both Corbin and Bailey.

"The accomplishment of a great task is in itself important; however, it is the person you become in the process of overcoming the obstacles associated with lofty endeavors that will last forever." (PLH)

Permanent Address:
P.O Box 33691
Dayton OH, 45433

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE September 1997	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE INTERNATIONAL ARMAMENTS COOPERATION IN THE POST-COLD WAR ERA		5. FUNDING NUMBERS	
6. AUTHOR(S) PAUL L. HARTMAN, 1LT, USAF			
7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S) Air Force Institute of Technology 2950 P Street WPAFB OH 45433-7765		8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/GAL/LAL/97S-3	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) DEPUTY UNDER SECRETARY OF DEFENSE, INTERNATIONAL AND COMMERCIAL PROGRAMS RM 3E 1082 3070 Defense Pentagon Washington DC 20301-3070		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 Words) During the height of the Cold War, the United States Department of Defense had a focused acquisition effort to produce major weapons systems. These weapons systems were developed as single service acquisition efforts. Their high costs were justified by their sophisticated technology, which enabled the U.S. military to gain and maintain air and ground combat superiority. Such acquisition practices significantly increased the defense budget, which peaked in 1985 at \$414 billion. However, with the collapse of the Soviet Union and an absence of a single galvanizing threat to global security, the U.S. has been forced to drastically cut defense spending. Although there is no longer a central security concern for the U.S., there are new threats that require new defense objectives--and containing these threats is not cheap. Senior defense leaders agree that the U.S. policy of fielding technologically superior weapon systems will not change. What alternative, then, will effectively enable the U.S. to meet reduced spending goals, yet maintain current national security levels? This thesis suggests that international armaments cooperation is a viable alternative to former high-cost acquisition practices if implemented using any of the four proposed armaments cooperation models.			
14. Subject Terms International Armaments Cooperation, Cooperative Research and Development, Defense Cooperation, Trans-Atlantic Teaming, Family of Weapons		15. NUMBER OF PAGES 129	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
Z39-102

AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. Please return completed questionnaire to: AIR FORCE INSTITUTE OF TECHNOLOGY/LAC, 2950 P STREET, WRIGHT-PATTERSON AFB OH 45433-7765. Your response is important. Thank you.

1. Did this research contribute to a current research project? a. Yes b. No
2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it? a. Yes b. No
3. Please estimate what this research would have cost in terms of manpower and dollars if it had been accomplished under contract or if it had been done in-house.

Man Years _____ \$ _____

4. Whether or not you were able to establish an equivalent value for this research (in Question 3), what is your estimate of its significance?
a. Highly Significant b. Significant c. Slightly Significant d. Of No Significance
5. Comments (Please feel free to use a separate sheet for more detailed answers and include it with this form):

Name and Grade

Organization

Position or Title

Address